THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. OCTOBER 25. 1894. CHICAGO, ILL. NUMBER 43

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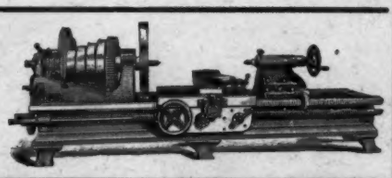

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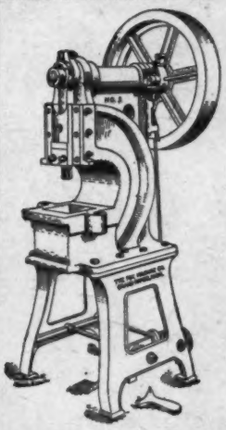

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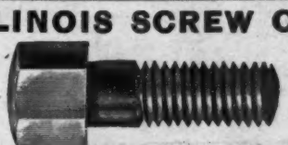

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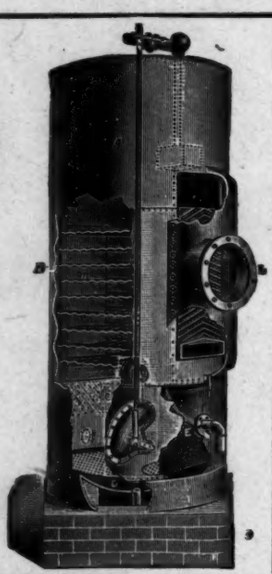

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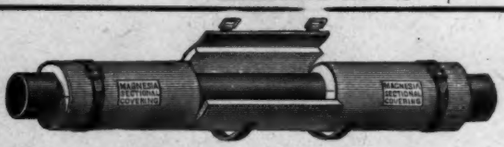

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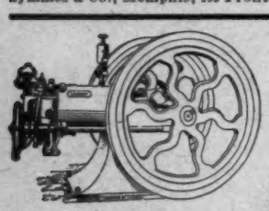

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THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. OCTOBER 25, 1894. CHICAGO, ILL. NUMBER 43.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

Market conditions are still furnishing arguments for both bearish and sanguine views of the future. In raw material the predictions of those who began in September to prepare the trade for a slump, have not been realized —certainly not to the extent conceded by the less hopeful. Bessemer pig has held its own since the recovery a week ago of a portion of the ground that had been lost and $11 is the market to-day. In foundry iron there is a fair demand in some selling centers, with indications that consumption is increasing, though slowly. The chief Southern producers are endeavoring to hold prices in territory in which Southern iron has no competition. In other markets they are meeting the low prices made by Northern furnaces. In Chicago, in pursuance of this policy, local coke furnaces are not having the field so completely to themselves. A sale of Southern No. 2 soft was made there at $10 recently. For shipment east some sales of No. 2 soft have been made by Southern producers at $7.50 at furnace. There is an evident determination by the furnace firms of the South to regain some of the ground that has been lost to them in the reign of low prices made possible by the cheapest coke and the cheapest Lake Superior ores in the history of the trade. Eastern reports indicate a more active market the past week. While prices are weak more business has developed in that section. In finished material the aggregate of orders in the East is larger, though the promise of future business is not specially assuring. Several hundred tons of iron plates were taken in one Philadelphia order. Wrought pipe demand has caused some activity, also, in skelp. There has been some improvement in the buying of billets for Eastern mills, Pittsburg sellers coming to a basis of $17.75 to $18 delivered at Philadelphia. In most instances Pittsburg finishing mills are still well supplied with orders, structural contracts from the East helping out the large producers; but evidences appear in the Western market that some sellers are crowding for business. Prices in general are thus kept on a low level, with an exception here and there. Plates have been advanced by one producer, though the general market is not firmer. Sheets are an active market and the shut downs due to the tin-plate dead lock have shortened the supply.

THE CLEVELAND OUTLOOK.

The approach of the closing weeks of navigation has reminded furnacemen that to get the benefit of direct shipment from vessels purchases of ore likely to be needed in the winter months could not longer be postponed. A number of lots have been taken in the past week or ten days, an aggregate of upward of 125,000 tons of standard Bessemers—hard ores and hematites—having been closed in that time. The largest single transaction was 40,000 tons. In all cases the prices secured were on the basis of the contracts closed early in the season. The position of Bessemer producers is a firm one, in view of the enormous consumption of these ores now going on in the districts supplied exclusively from the Lake Superior region. It is well known that the rate of such consumption is today greater than has ever been achieved, and the October blast furnace returns have been studied with keen interest by iron ore selling firms. Latest figures would indicate that the total of ore shipments will go above 6,500,000 tons, but there is a general belief among shippers of Bessemer ores that the coming winter, with no interruption from coke troubles on Jan. 1, will make a large inroad upon Bessemer ores on the docks. In the past week 90 cents has been paid on Ashland charters and business has been done at both 85 and 90 cents from Duluth.

Pig Iron. Valley furnaces are making the largest output in their history, most of it Bessemer iron. In nearly all cases, too, the rated output of these furnaces is being exceeded—in conspicuous instances largely exceeded. Yet with all this heavy output there is no piling of iron, and within the week just passed the price has been stationary. No considerable amount of Bessemer iron from valley stacks has been offered in Pittsburg and owing to the purchase of several lots of iron in Pittsburg for districts farther east the price there has been kept quite firmly at $11. The extent of the Ohio Steel Co.'s buying is of course a matter of conjecture thus far. It does not appear that any deals have been closed as the result of its recent inquiries for November and December Bessemer. The statement is made that about 20,000 tons of Bessemer iron will be taken in these initial purchases. No figuring is done, either by furnacemen or steelmakers, that reaches beyond the end of the year. The coke question will be all important then. Any considerable advance in the price of coke will be attended by a demand by coke workers for higher wages, and all that ground may have to be gone over again. The foundry iron trade changes little either in volume or price, though the indications point to an increase in the former, with no strengthening in the latter. Mill iron is quiet and at an unchanged price.

Finished Material. Reports from finished lines are somewhat conflicting, though the majority of signs are favorable. One mill represented in the Cleveland market has advanced prices of plates $2 a ton, and on certain specifications $3 a ton. In another direction, however, there are still some traces of weakness. A 500-ton plate contract was closed in this market in the week, and there are inquiries out that point to considerable additional business. In beams and channels, demand is lighter with prices unchanged at 1.25c @ 1.30c. There is nothing to note concerning bars, but a continuance of the very low figures recently named. A 400-ton contract for agricultural purposes went to a valley concern at the lowest point under 90c yet recorded. In sheets a good demand exists and prices on iron and steel are closer together than for some time, No. 27 being quoted 2.30c. Old material firms are firmer than one month ago, and are getting a moderate advance in some cases.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The past week has been quiet, with no new developments, and only a moderate run of business. The outlook is a little more encouraging, however, and it is likely that business will be better in the near future. Pig iron shows sales of small amounts, but a good many of them and well scattered. Bars show a little improvement in the amount of sales, but none in price. Structural material is quieter and prices are rather weak. Rails show a falling off in sales, but the chances for business in the next month or so are good, and the local mills expect to close a number of orders in that time. Billets and rods, plates, merchant steel, sheets and old material are quiet and unchanged, with a good outlook for the future.

PIG IRON.—In the past week local iron has sold very well in small lots from carloads up to 300 and 500 tons, and the orders have come from a widely scattered territory. The total for the week was a little better than that of the week previous, and as inquiries keep up well, the dealers are feeling a little more encouraged. Prices are unchanged, and are quite firm at our quotations. In Southern iron sales have been fewer and smaller. Inquiries have fallen off, and it is hardly probable that business will be much better for the next two or three weeks, at least. Prices continue to be weak, and charges are made on every side that not only the smaller furnaces but the larger ones are cutting quotations to the bone. It is said that a meeting was held recently, of three of the largest Southern furnace companies, at Birmingham, at which it was decided that Chicago would be considered open territory, in which each furnace could make any price it pleased, to get the business away from the local furnaces. The local furnacemen, however, say that they will meet any price that the Southern furnaces may make, as they do not intend to let the business in this territory get away from them if it is possible to hold it. Lake Superior charcoal iron is quiet, with only a small carload trade going. There is still a fairly good demand for Ohio silveries, and one or two sales of fair amounts were made in the last week. Our quotations are as follows:

Lake Sup. Charcoal	$14 75@15 25	South'n Silveries No. 1.	$12 00@12 25
Local Coke Fdy. No. 1	10 25@10 50	South'n Silveries No. 2.	11 50@11 75
Local Coke Fdy. No. 2	10 00@10 25	Jackson Co. Silveries	14 50@15 00
Local Coke Fdy. No. 3	9 50@10 00	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 1.	10 75@11 00	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 2.	10 00@10 50	Ohio Strong Softeners	13 00@13 50
Local Scotch Fdy. No. 3.	9 50@10 00	Alabama Car Wheel	17 75@18 25
South'n Coke No. 1	11 25@11 50	South'n Charcoal No. 1.	15 50
South'n Coke No. 2	10 50@10 75	South'n Charcoal No. 2.	14 50
South'n Coke No. 3	10 00@10 25	South'n Charcoal No. 3.	14 00
Southern No. 1 Soft	10 50@10 75	Malleable Bessemer	10 75@11 25
Southern No. 2 Soft	10 25@10 50	Coke Bessemer	11 25@11 50

BARS.—The inquiry has been a little better in the past week and a few sales were made of quite large quantities. The demand is still good, and it is likely that the present week will see a good amount of orders taken. Prices are unchanged from last week, at 1c. for common iron, 1.15c. to 1.20c. for guaranteed iron, and 1.25c. to 1.30c for steel bars.

STRUCTURAL MATERIAL.—The demand fell off considerably last week, and except for business in small quantities from local yards, almost nothing was done. Prices are unchanged, but are weak. Beams, 1.45c; plates, 1.45c; angles, 1.40c; tees, 1.65c. Small lots from stock are quoted from ¼c to ½c higher.

RAILS AND TRACK SUPPLIES.—Orders have been light but there are some good specifications in the market, and it is likely that they will develop into orders within the next few weeks. There is a good demand for deliveries up to the first of the year, and although there is no demand for deliveries later than that, it is expected that by the end of the year inquiries from several of the Western roads will be received. Prices are as follows: Rails, $25 to $27; splice bars, 1.25c to 1.30c; track bolts, 2c. to 2.10c; spikes, 1.75c. to 1.80c.

BILLETS AND RODS.—There is nothing new in the situation, and no sales of any consequence were made last week. Prices are only nominal at $18 for billets, and $25 for rods.

PLATES.—There is a rather better demand for plates, and some good sized mill orders were taken last week. It is predicted that the market will show considerable more improvement by next week. Prices are unchanged from our last report: Tank steel, 1.40c to 1.50c; flange steel, 1.65c to 1.70c; firebox steel, 1.75c to 5c; boiler tubes, 75 per cent. discount.

MERCHANT STEEL.—Only a small business has been done, and as there is only a small demand, it is not likely that the next few weeks will see much improvement. Quotations are unchanged: Open-hearth spring, tire and machinery steel, 1.75c to 1.80c; smooth finished machinery, and tire, 1.50c. to 1.60c.; Bessemer bars 1.40c. to 1.45c.; tool steel, 5.50c to 7.50c.; specials, 11c. and upwards.

SHEETS.—Trade has been somewhat more quiet, but still some good orders have been taken, both for black and galvanized sheets. Prices are being well maintained. Black sheets, No. 27 common, 2.35c. to 2.40c.; steel sheets 2.50c., galvanized sheets 75 and 10 and 5 per cent. discount.

OLD RAILS AND WHEELS.—A sale of 1,700 tons of old iron rails to be delivered at an eastern mill was made, at a figure equal to about $11.15, Chicago. Aside from this, only a few small sales were made. Old steel rails were quiet and nominal at $7.50 for short lengths, and $10.50 to $11 for long lengths. Old car wheels were in small demand at $10 to $10.50.

SCRAP.—A good business has been done in scrap, at prices a little lower than those made last week. Quotations are made as follows: No. 1 forge, $8.50 $9.00; No. 1 mill, $7.; No. 1 machinery, $7.50; axles, $13.50; cast borings, $3.25; wrought turnings, $5.00; axle turnings, $6.50; mixed steel, $5.50; heavy cast, $7 to $7.50; stove plates, $5 to $5.25; heavy steel, $7 to $7.25.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The recovery last week of about 15 cents of the decline in Bessemer pig, in this market, has been followed in the present week by stationary prices, with $11 for October and November deliveries, as the average of the market. In the buying movement of a week or more ago some contracting was done at $11 10. A 3,000-ton sale was made the past week at $10.35, valley furnace. The strength of Bessemer pig, with the heavy output now being made, occasions surprise in some quarters; but the purchases the Ohio Steel Co. will make next month has relieved the pressure to sell by the valley furnaces not well sold ahead, and there has been a further demand in this market for Bessemer for shipment east of Pittsburg. Of the 23 furnaces active in Allegheny county, only four or five Bessemer producers are selling on the market. The billet market still inclines to weakness, but the Wheeling district mills that cut the Pittsburg price 25 to 40 cents are now supplied with orders and the local situation is likely to be steadied somewhat. Business is done in a limited way, on a $16 basis for immediate deliveries and this is shaded on contracts running to the end of the year. The out-

look for the mills is no more assuring than was noted a week ago. Here and there order books are filled for several weeks ahead in a single line, but the largest producers are reaching out with increased eagerness, for the small lot business going. Plates show considerable unevenness, one mill holding more stiffly while in another quarter very low prices are being quoted. In structural material there is a fair run of small orders, with reports of further good-sized contracts coming up in the East. Prices on iron and steel bars seem to be at the lowest notch, and it will soon be in order to talk about a one-cent card rate as a wage-scale basis. Reports from the Mahoning valley indicate that 90c. has been shaded freely on larger contracts. Sheets are in fair demand and 2.25c@2 30c. for No. 27 iron is the quotation, with a slight advance for steel, though the difference is less than ruled two or three months ago. The closing down of the black plate mills has made trouble in getting sheet orders filled. Coke production is a trifle lighter, but the tonnage is still large and prices are on the same low basis. Old material is in better demand, with prices more firmly held.

Cincinnati. The hopeful feature of the iron market is that stocks increase very slowly, if at all, in spite of the fact that nearly all available furnaces are in operation—that is, furnaces located so they can produce iron and realize cost at present prices. Consumption is evidently increasing slightly, but there are many complaints from those who expected to have their works well filled with orders by this time. Hopes of contracts from railroads this year are no longer entertained, and some of the leading railroad officials talk in a much less sanguine tone than they did two months ago. The lull in demand for pig iron has been broken to some extent during the past week by the placing of orders for several round lots. There is no general buying, however, and a desire is evident to hold off until the metal is actually needed. There is very keen competion among sellers for the business that is going, and weak spots have developed. When the best class of Eastern buyers come into the market it is believed they will not be obliged to consider Eastern brands only. Alabama companies can not afford to allow those who have used their irons satisfactorily to discontinue and make mixtures without them. Southern irons gained their position after a hard fought battle, and producers say they are not to be retired now. Eleven furnaces are now in blast, owned by the Tennessee Coal, Iron & Railway Co. In the Hanging Rock district, Belfont, at Ironton, O., has relined and is in successful operation. Hamilton at Hanging Rock, O., blew in Oct. 17, after a stoppage of over three years. In charcoal irons the only active movement is in Lake Superior. The furnace companies seem to have reached a point in prices below which they will not sell, but the bankrupt stocks are a disturbing factor.

Buffalo. Consumers of pig iron are almost unanimous in the opinion that the market is weak and therefore will buy for their nearby requirements only. Stocks are actually decreasing, though it is hard to know why they are doing such a thing, and while prices are low, they are firm.

St. Louis. The sale of iron in this market the past week shows a larger aggregate tonnage than any one week previous for several months. All the Birmingham group of furnaces and three or four in Tennessee are endeavoring to maintain prices, but some outside furnaces wanting business have made concessions to get their product established in the market. The demand has been mostly for standard Birmingham or Tennessee irons, with an occasional order for Lake Superior charcoal iron.

TESTING MACHINE MANIPULATION.

A feature of the investigation of armor plate irregularities at Homestead, by the Cummings committee, was the opportunity given one of the informers to prove his assertion that the fraudulent records of tensile strength were made by running the testing machine rapidly. His attempts to show the committee how this was done did not result in registering appreciably higher figures by means of rapid manipulation. The question has been somewhat discussed of late, and both sides have advocates. Mr. Wm. Kent, in a communication to the *American Machinist*, raises a double question, in the following:

"The question at issue is 'Does the machine when run rapidly register a greater stress than actually exists in the test piece, and, if so, why?' It is a different one from the other question, which may be confused with it, 'Does the test piece offer a greater resistance to rupture when it is stretched rapidly than when it is stretched slowly?' If we test a piece rapidly, and the machine indicates a higher resistance than it indicated on a duplicate piece tested slowly, both of the above questions arise. Is the higher registration due to increased resistance of the piece itself, or to false registration of the testing machine?"

In the opinion of Gus. C. Henning, whose ability to speak on the question will not be questioned, results depend very much on the type of machine used. He says: "The effect of rapid and slow testing was clearly shown a number of years ago and repeatedly since. It is, in the first place, an admitted fact that results are higher when testing very rapidly and using a multiple lever knife-edge machine. A number of pieces were cut from a bar of Bessemer steel of about 70,000 pounds tenacity, and while six were tested slowly on an emery machine, six others were tested as rapidly as the skill of operator permitted. The results showed no definite differences. The reports of the Bauschinger conferences also contain a statement, that 'for the usual speeds of testing in use, no appreciable differences in resistance were noticed.' These facts distinctly show that there are differences due to type of machine."

WHEN George Westinghouse, Jr., invented his air-brake he took it to Commodore Vanderbilt in the hope of getting him sufficiently interested in it to adopt it on the New York Central road. The old Commodore went right on with his correspondence while Westinghouse explained how by an air pressure of 30 pounds to the square foot the brake was applied by the engineer, and when he finished waited patiently for the verdict. The old Commodore raised his head long enough to jerk out: "What's that you say about air?" Westinghouse told him. Looking him steadily in the face the old man replied in freezing tones: "That will do: I have no time to waste with a d——d fool." Then Westinghouse went to President Tom Scott, of the Pennsylvania railroad, and so impressed him that the road adopted the brake. Other roads followed suit and the inventor soon achieved fame and fortune. When that time had arrived he one day received a letter from Commodore Vanderbilt asking him to call at the Central's office. Mr. Westinghouse's reply was terse and to the point. He simply wrote: "I have no time to waste with a d——d fool."—[Electrical Review.

WM. F. SUMMERS, a United States inspector of iron work, dropped dead, Oct. 23, at the office of the Variety Iron Works, Cleveland. Heart disease is the supposed cause. Mr. Summers was detailed to inspect some iron construction for Government use, on which the Variety Iron Works were engaged. His home was in Charleston, W. Va.

WILLIAM TAYLOR & SONS, proprietors of the Columbia Iron Works, Brooklyn, N. Y., made an assignment Oct. 22. The business was established 50 years ago by William Taylor, who died in June, 1889, and his sons, James A., William J., and Edwin D., have been partners in the concern 30 years.

THE IRON TRADE REVIEW

DEVOTED TO

IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

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A. I. FINDLEY, Editor.

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CONCENTRATION OF BESSEMER PRODUCTION.

Close observers of blast furnace records in the past two months have not failed to note the heavy output of coke iron in certain districts. These districts, it is well known, are the center of Bessemer pig iron production. What the blast furnace tables and the semi-annual pig iron statistics have been telling concerning them in the past twelve-month only confirms what market reports have been showing week by week, namely, that the steel production of the country has been rapidly centering in the area of greatest economies.

What the statistics show, in a word, is that from producing 46.5 per cent. of the Bessemer pig iron output of the country in the first half of 1891, the furnaces of Eastern Ohio, Allegheny county, the Shenango valley and Wheeling contributed 68.9 per cent. of the Bessemer iron produced in the first six months of 1894. The most significant fact in this connection is that the greater part of this increased percentage was gained in the second half of 1893 after the depression had brought prices to a basis that meant loss to many producers.

In the table given below, the Bessemer pig production in half year periods beginning with 1891 is shown in the first column. In the second column is given the Bessemer production of Ohio, Allegheny County, Shenango Valley and Wheeling district furnaces in the same periods; and in the third column appear the percentages for the districts named:

	Total production Bess. pig. Gross tons.	Production in districts named. Gross tons.	Percentage for districts named.
First half of 1891	1,341,475	605,246	46.5
Second half of 1891	2,130,715	1,084,345	50.9
First half of 1892	2,254,345	1,173,810	52.
Second half of 1892	2,189,696	1,120,472	51.2
First half of 1893	2,374,800	1,287,180	54.2
Second half of 1893	1,193,708	821,059	68.7
First half of 1894	1,501,487	1,035,634	68.9

The silencing of the Sparrow's Point furnaces and a largely decreased production by the Illinois Steel Co. furnishes a partial explanation of the change in percentage in favor of the four districts named above, in the second half of last year. Yet these facts do not modify the inference that lowest costs are achieved in the four districts in question. The large sales of Bessemer iron from the valleys and Pittsburg for Eastern delivery early in 1894 are a matter of general knowledge, as are the heavy shipments of billets and finished material from the Pittsburg district into territory tributary to Eastern works. It is known that in New York and Eastern Pennsylvania the production of Bessemer iron has fallen off heavily in the past year. From being 491,319 tons in the first half of 1893, the Bessemer output of furnaces in New York and in the Lehigh, Schuylkill, Upper and Lower Susquehanna Valleys was 199,420 tons in the second half of 1893 and 185,167 tons in the first half of this year. Pittsburg and valley furnaces, on the other hand, in spite of the coke strike, largely increased their Bessemer output in the first half of this year as compared with the second half of 1893.

A study of the blast furnace returns for Oct. 1 only emphasizes the showing of the figures given above. It is impossible to separate accurately the Bessemer production from that of foundry aud forge irons. But it is significant that of 135,429 tons, the total estimated weekly capacity of all coke furnaces on Oct. 1, the furnaces in Northern and Eastern Ohio, the Shenango Valley, Allegheny county and the Wheeling district contributed 78,385 tons, or at the rate of 4,076,020 tons a year. When it is considered that 80 to 85 per cent. of the output of the districts named is Bessemer iron it can be seen that they are now producing Bessemer iron at an annual rate practically equal to the entire Bessemer make of the country in 1893.

A time of low values like the present has made it imperative that every economy in assembling materials and in the operation of plants be compassed by the producer who would stay in the race. This has crowded into the most favored district a larger proportion of the country's pig iron production than it has ever contributed before. Today's price basis forbids such a retracing of lines in the transportation of raw materials and finished product, as has long been the habit of the American iron trade. The shortest distance between sources of raw materials and the assembling point, and the shortest distances between the manufacturing point and the important consuming districts, are the factors determining the drift of the center of largest production. These considerations have caused the pronounced movement that has been in progress within the past twelve months—a movement that has a most important bearing on the immediate future of steel-making in the United States. The freight on, say, 3,400 pounds of Lake Superior ore, as compared with that on 1,900 pounds of Connellsville coke is having an influence greater than it ever exerted in the days of higher values and larger margins, in forcing the center of Bessemer pig making close to Lake Erie. What this means for Lake Superior ores is too plain to require specification. Imported Bessemers, New York concentrates and Cornwall ores will figure to a less extent than ever in the steel pig mixtures of the country. And Ohio, as both statistics and actual construction operations prophesy, will rapidly diminish the gap between her Bessemer output and that of the Keystone State.

IT IS a singular fact, observes *Modern Progress*, that today the man who can "turn his hand to anything" in the machine-shop, or the man who can mold anything on floor or bench, is more often out of a job than in one. Specialization is rapidly eliminating the all-around mechanic. The machine that performs the one-hundredth

part of the processes involved in making a pin must have its man for that fractional process. The monotony of shop work has been much increased and individuality is repressed, rather than developed. This is one of the things that must be set down on the debit side, in balancing the account of the labor-saving machine.

THE GAIN IN OPEN-HEARTH STEEL.

A rapid expansion of open-hearth steel making in Great Britain in the first six months of this year is shown by the returns just published by the British Iron Trade Association. Following up its somewhat sensational article of a few weeks ago on the decay of the British iron industry in the past decade, the London *Times* calls attention to these late figures concerning steel production, to point an observation as to the great change that has taken place in the relative output of iron and steel. In its former article the *Times* used this table to indicate what the shrinkage had been in the ten years from 1883 to 1893.

	1883. Tons.	1893. Tons.
Production of pig iron	8,490,000	6,830,000
" Manufactured iron	2,730,000	1,364,000
" Bessemer steel	1,553,000	1,493,000
" " Open-hearth steel	455,000	1,456,000
Totals	13,228,000	11,143,000

Late figures give some encouragment on the side of steel—the returns to the British Iron Trade Association making the total of Bessemer steel ingots for the first six months of 1894, 810,392 tons, and of open-hearth steel 1,029,409. This latter record is the largest for a half year, in the history of the trade, and is at the rate of 2,058,818 tons a year, or nearly 50 per cent. greater than the output of 1893. For the preceding four years open-hearth steel in Great Britain had been practically stationary, and 1892 and 1893 showed a slight falling off from the two years preceding. In the United States the increase has been steady, and last year, when the Bessemer output fell off 20 per cent. from that of 1892, the open-hearth record was 10 per cent. greater than that of the preceding year. The course of the two industries in the two countries in the past 4½ years is indicated in the following table:

	UNITED STATES.		GREAT BRITAIN.	
	Bessemer ingots—tons.	Open-hearth ingots—tons.	Bessemer ingots—tons.	Open-hearth ingots—tons.
1890	3,688,871	512,232	2,014,843	1,564,200
1891	3,247,417	579,753	1,642,005	1,514,538
1892	4,168,435	669,889	1,500,810	1,418,830
1893	3,215,686	737,850	1,493,454	1,456,323
First half 1894	1,667,454	.....	810,392	1,029,409

Since a number of steel works in Scotland have been idle for the past three months, it is to be expected that the production from July to December inclusive will fall much below the remarkable output for the first six months. In the United States the probabilities are that a further increase will be scored in the present year.

Of the 1,029,409 tons of open hearth steel made in Great Britain in the first half of 1894, the output by the acid process was 956,881 tons, and by the basic process 72,538 tons. In the United States, though no separate statistics are reported, the proportion of basic open hearth steel is larger than in Great Britain.

THE Lehigh Valley Railroad Co. has adopted the 45-ft. length of steel rails for all renewals. The weak points in the track, its joints, and the cost thereof, are reduced ⅓ as compared with a 30-ft. rail. The objections found to the 60-ft. rail are the large space left between the ends of rails due to contraction in cold weather and the fact that in making renewals the force of men ordinarily employed on a five-mile section could not readily handle them. When renewals of rails are again made in the longer tunnels of the Lehigh Valley, a 90-ft. rail will be used.

THE statement of British iron and steel exports to the United States in September reflects plainly the influence of the new tariff. The total was 21,819 tons against 17,437 tons in September of the preceding year. For August the total was 23,903 tons, compared with 20,427 tons in August, 1893. The items are as follows:

	September 1893, tons.	September 1894, tons.
Pig iron	545	907
Bar, angle and bolt iron	38	65
Rails	.....	9
Hoops, sheets and plates	1,062	19
Tin plates	14,789	17,672
Old iron	24	358
Steel, unwrought	756	2,286
Wire, iron and steel	193	503
	17,437	21,819

The increased tin plate exports shown were either for storage, awaiting the taking effect of the new duty, Oct. 1, or were shipped late enough in September for direct entry under the lower tariff. The falling off in sheets and plates is largely due to the increased tariff on black plates and the uncertainty of the policy of foreign makers concerning the American market.

EDWARD ATKINSON, the well known economist, who made a study of the recent developments in iron and steel manufacture in Great Britain, in a visit to the other side the past summer, concludes that the future of the iron trade will largely be associated with the development of the United States, and that Great Britain relatively will fall back in the race. He basis this latter opinion largely on the increased difficulty of obtaining cheap supplies of suitable ores from Spain and Sweden.

THE wages of miners in the Lake Superior region are now down to the lowest point at which the necessaries of life can be compassed by the earnings of the average employe. Yet in some of the older districts there is the added menace of irregular employment. There need be no counting on any further yielding in ore prices, unless it be contributed by other cost items than labor.

IF buyers could have some assurance of the permanence of the present tariff there might be a change from the hand-to-mouth policy of buying that has prevailed for the past two years. Such an assurance from the November elections would be worth much to every department of the iron and steel trades.

BALANCING the account of favorable and unfavorable signs, there is a large preponderance of the former in the outlook for iron and steel.

The Tradesman, Chattanooga, Tenn., in its report on the industrial condition of the South for the week ending Oct. 15, says: Southern lumber interests are receiving needed attention. Organizations are being perfected with a view to promote better understandings between buyers and sellers, and to aid in obtaining remunerative prices. Cotton is coming into market in excellent condition; coal and iron are in active and increasing demand, and new textile mills and enlargements of existing ones continue to be reported. An advance in prices is only needed to make the South more prosperous than it ever has been. *The Tradesman* reports 38 new industries as established or incorporated during the week, together with nine enlargements of manufactories, and 15 important new buildings.

FORMING ROLLS—PUNCH AND SHEAR.

Sheet iron workers will find a number of new and advantageous features in the improved machinery illustrated in connection with this article. Bertsch & Co., of Cambridge City, Ind., well known manufacturers of metal-working equipment, are the designers and builders. Fig. 1 shows their 98x4 inch forming rolls, used for sheet metal of all descriptions from three-fourths inch up. They are self-opening and self-closing and are made to be operated either by hand or by power or by both. The operator can open the rolls in five seconds, this being accomplished by the disengagement of the bearing buckle. When thus removed and turned back from the top roll journal it elevates and supports the top roll, and at the same time lowers the opposite end of the lower feed roll to release a wide plate at the opposite side. The two feed rolls are in a manner balanced and free to open from end to end with ease. The lower roll is free to lower slightly at the opposite end from that at which the top roll is elevated, and when the latter is close the lower roll is again free to elevate at its depressed end, being thus properly adjusted as long as the same thickness of plate is being worked. When a thicker or thinner plate is introduced the lower roll is adjusted as desired at both ends. Much time is saved by this arrangement and the top roll need not be elevated so high.

The rolls are provided with the builders improved quick adjustment on the back roll, which is the main bending roll. This attachment is composed of a link belt chain and sprocket wheels on adjusting screws. One or both ends of the back roll can be adjusted quickly and accurately at one time, insuring uniform work and saving much time. For cone or tapering work, one end of the roll can be adjusted any angle by inserting a tapering wedge under the journal box. This improvement is desirable and labor-saving on the back roll, especially if used in a dark place or basement, or any place where there is insufficient light, in which case it would not be convenient to adjust the roll properly any other way. Rolls will be provided with single or double back gear, or plain without back gear, according to size of roll and work to be performed. The makers also have a similar crimping or corrugating roll for corrugating pipe, etc.

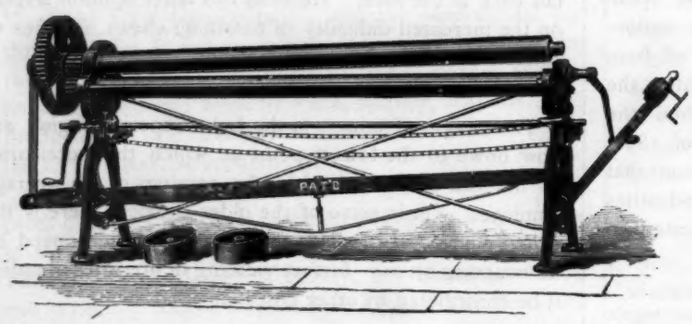

FIG. 1.

Fig. 2 illustrates Bertsch's patent improved combined punch and shear, which is for a general line of light and heavy sheet iron work. It is made in eight sizes, with 4, 8, 12, 15 and 18″ throat punch, adapted to punch flange and angle iron, and 8, 10, 12 and 18″ blades to cut round or flat bar iron and sheets as desired up to ⅜″ plates. The working parts of the punch and shear are not combined as usual, each part being independent of the other. It will not require two men to operate the machine for punching, a feature so common in all others. The punch and shear are each provided with a lever socket, making it very convenient for two to use the machine at once, except when cutting long sheets. The lever on the punch will work from the front or rear. The lever socket on the shear has a series of holes for adjusting the knife bar links so as to cut but half the length of the blades, which increases the power from 50 to 100 per cent. The bearings are made of steel and are extra wide and long. The knife bar has a bearing on the rear side, which prevents springing.

With the punch are furnished three sets of punches and dies, back gauge, improved side pin gauge for punching holes of equal distance apart without marking off, and strengthening bolts for deep throat punches. With strengthening bolts the No. 5 will punch ⅜ through ⅜ instead of $\frac{5}{16}$ through $\frac{5}{16}$; No. 8, ½ through ⅜; No. 9, ⅜ through ⅜; No. 9A, ½ through ⅜. No. 9 is made heavier to punch ⅜ through ¼. No. 11 will be furnished with an extra top blade for trimming ⅜ plates. Nos. 2 and 3 are furnished with strengthening bolt on shear for cutting heavier bars.

The makers will send on application detailed descriptions of these machines, showing the different sizes in which they are made and their adaptations to various requirements.

FIG. 2

THE OUTWARD MOVEMENT OF GOLD.

The depression which followed a long period of over-production and over-speculation, and which began with the Baring failure, has resulted in a great accumulation of idle capital at all the monetary centers. In New York, as in London and Paris, there are heavy balances ready for use. Under these circumstances a small increase in the rate of interest anywhere is sufficient to cause the transfer of balances to that point. The occasion has arisen at the present moment in Germany, where a new Austrian gold loan, the rumored decision of the Imperial government to increase its gold reserve, and the prospect of an Eastern war loan have combined to create a temporary demand for money. The rise in interest, though small, is still sufficient to cause a movement of the money held here toward Berlin, large enough to more than absorb for the moment the offerings of grain, cotton and other merchandise bills, especially of grain exports have been comparatively light, and the market conditions are not such as to induce any considerable foreign buying of securities. The natural result is the rise in exchange to a point where it is a little cheaper to ship gold than to buy bills.

How long this state of affairs may continue, and to what extent the consequent gold exports may go, it is not easy to say. We do not, however, anticipate any very heavy exports, nor does it seem probable that they will extend over a long period unless some further demand, now unexpected, should arise. It must be said, however, that our exports for September have shown a heavy decrease from last year, chiefly in grain, which may help to keep the exchange rate up for a time.

Another point which may be briefly referred to is that the United States is the largest gold producer in the world. Our output is undoubtedly greater than the amount which we need for use in the arts and to keep up our coinage stock. The excess is quite as legitimate an object of export and sale as silver or grain. From this point of view there is nothing to fear from an outward gold movement, provided it does not extend, as in 1892, to an amount which indicates distrust and a general withdrawal of foreign capital. No such movement is probable now, since our business condition is far sounder now than at that time, and our currency questions are at least on the road to adjustment.—[Engineering and Mining Journal.

AMERICAN pig iron warrant stocks Oct. 20, 102,500 tons.

LAKE SUPERIOR IRON MINES.

Ashland ore shipments last week were 57,711 tons. From Duluth about 40,000 tons were sent out. Shipments to Oct. 16 by the Wisconsin Central, from Ashland, were 588,955 tons, and by the Northwestern, 958,854 tons, making a total of 1,547,809 tons. To the same date last year the shipments were 1,037,983 tons. The season will practically close Nov. 1, with a total of about 1,650,000 tons.

Monday, Oct. 29, is the date set for the sale of the Chapin mine. The effort of Milwaukee parties to get second mortgage bondholders to pay in 25 per cent. of the face of their holdings so as to pay off the unsatisfied first mortgage bonds and then bid in the property does not promise to be successful.

At a recent meeting of the Adams Mining Co., a member of the Lake Superior Consolidated Mines, a new lease was made by which the fee owners, Robinson & Flynn, of Detroit, agree to a reduction of royalty from 35 to 25 cents per ton, and the mining company agree to increase its minimum output to 200,000 tons next year, and 100,000 tons each of the remaining 19 years of the lease. The old lease provided for practically a minimum of only 30,000 tons. The Duluth, Mesabi & Northern road will build to the mine a 3½ mile spur.

Milwaukee and Chicago interests are negotiating for the purchase of the Escanaba River Land & Iron Co.'s mine.

F. T. Gates, of New York, was elected president of the Duluth, Mesabi & Northern road at a meeting in Duluth last week. A vacancy has existed since Alfred Merritt declined re-election in February.

The Ashland mine has shipped its stockpiles made in the winter of 1892 93 and is not now employing any men. The future of the mine depends somewhat on the outcome of the reorganization of the Wisconsin Central Railway Co.

The Rathbun mine cut has been put through the Mountain Iron body a distance of 1,200 feet, and a track laid through it, giving the steam shovels a chance to work East and West in what is now the largest uncovered ore body on the Mesabi range. It will be possible to load 400 cars a day.

The Sellers Ore Co. has been incorporated to work the Sellers property near Hibbing, on the Mesabi. The incorporators are Robert W. Hunt, Morris Sellers and Joseph H. Chandler, of Chicago, and Henry C. Fownes, Charles L. Fitzhugh, Gottlieb A. Steiner, John F. Speer, William C. Fownes and James Kemphill, of Pittsburg, Pa.

The Minnesota Iron Co. has taken up the option it had from the Rouchleau Ray Iron Co., and an outright purchase has been made.

Total shipments from the Lake Angeline this season will be in the neighborhood of 300,000 tons.

There is some agitation among owners of Mesabi mines on State lands, looking to a reduction of the 25-cent royalty now paid to the State. It is urged, though the force of the argument is not apparent, that this is the salvation of the smaller operators. Such a reduction will not suffice, however, to offset the advantages the two largest companies have in railroad ownership and in vessel connections.

Hoisting of ore has been resumed at the Lake shaft of the Cleveland Cliffs Iron Co. at Ishpeming.

The Pewabic has shipped 285,000 tons of ore. For the remainder of the season the output will be light.

Soft ore has been struck at the Section 16 mine of the Lake Superior property. Explorations were begun some time since by means of a diamond drill at the bottom of the hard ore formation, 530 feet from surface and about 80 feet south of the main shaft. The drill touched ore at a distance of 60 feet from the starting point. Another 100 feet of depth was attained and the hole still bottomed in ore. The fact of a merchantable quality has been determined in the several assays that have been made from the drillings. Further is being done by the drill to test the regularity and extent of the deposit.—[Iron Ore, Ishpeming, Mich.

The Minnesota Iron Co. has filed a re-lease of the McInnis mine to Eldridge M. Fowler of Chicago, and he in turn has leased the mine to the Fayal Iron Co. The new lease provides for a royalty of 30 cents a ton on a minimum output of 100,000 tons. The Fayal Iron Co. promises to mine 75,000 tons by April 1, 1895. D. H. Bacon, president of the Minnesota Iron Co., is also president of the Fayal Iron Co.

Work at the Montreal mine on the Gogebic range is proving up a very large body of ore. Development is toward the east from the main shaft and extends into Section 33, now a part of the Montreal property.

The water in the Ashland mine has raised to the sixth level and has been running into the Norrie mine. Officers of the two properties are conferring with a view to providing a remedy.

INCREASING USE OF BALL BEARINGS.

The paper of C. W. Hunt before the Montreal meeting of the A. S. M. E. in June, under the title "A New Mechanical Fluid," detailed experiments of the writer in the use of hardened steel balls to take up the wear of journal boxes and keep them nicely adjusted to the shaft. The adjustment of these bearings was shown to be as delicate and positive as though a liquid were used. Dr. Coleman Sellers, in a lecture at Stevens Institute a short time ago, pointed out that one of the most notable examples of the use of balls is to diminish the friction of the collar that sustains the hook of a large crane. Without these balls the difference between the friction of rest and the friction of motion is so great that men are often seriously hurt by endeavoring to turn a load suspended upon the crane hook, which requires a great deal of exertion to start it, and when it does move, goes further than is intended, often leading to serious accidents. By making the crane hooks with flat washers, between which numerous small balls are placed, resting on hardened surfaces, there seems to be no difference between the friction of rest and the friction of motion, and hooks heavily loaded are turned with remarkable ease, so that the use of balls, distributed over plane surfaces, is quite common, there being no basket or grooves to separate the balls, which latter are allowed to move at their own will in whatever direction they are inclined to go.

"There is very little literature on the subject," says *Cassier's Magazine*, in referring to Dr. Seller's comments, "and the theory of ball bearings has not been worked out and published. It may be interesting, however, to know that some experiments have been going on for some time past in reference to the size of the balls best suited to the different purposes. In the case of hooks for cranes carrying about 50 tons, between 250 and 300 balls, each of three-eighths inch diameter, are scattered between the flat plates, with the idea that the more points of contact the longer the balls will last, but some experiments are now being tried with balls of different sizes, and motion kept up under loads to determine their durability, with a leaning in favor of larger balls and fewer of them."

Personal.

Andrew Carnegie is expected to return to Pittsburg within a fortnight.

Charles McClure will have charge of the Eastern office Wm. B. Pollock & Co., boiler manufacturers, of Youngstown, O., are establishing in the Havemeyer building, New York.

Chas. J. Butler, of Stillwater, Minn., proprietor of the Butler Iron Works died at Springbrook, Wis., Oct. 16, aged 72.

E. F. Williams, 1103 Havemeyer Building, has been made Eastern agent of Wm. Tod & Co., Youngstown, O., engine manufacturers.

Perry Mackey has been appointed superintendent of the converting departments of the Edgar Thomson Steel Works, succeeding Wm. J. Miller, resigned.

AN Indianapolis dispatch says that delegates from iron working organizations are in attendance at a convention of iron workers. Machinists, boiler makers, pattern makers, molders, blacksmiths and metal polishers are said to be chiefly represented.

PRESIDENT Garland, of the Amalgamated Association, who has just returned to Pittsburg from a Western trip, says that tin plate mills at Elwood, Gas City, and Middleton, Ind., and at Canal Dover, O., are running and paying scale wages.

THE W. Dewees Wood Co., of McKeesport, Pa., has made a contract for the erection of a new forge building. It will be entirely of iron.

BRITISH DRIFT FROM IRON TO STEEL.

In calling attention to the change from iron to steel that has been going on in Great Britain in the past few years, the London *Times* of recent date makes the following observations:

The development to which we have called attention, however, has been less an absolute advance in the volume of production than the expansion of one or two branches of the trade at the expense of others. As recently as 1882 we produced in this country 2,841,000 tons of wrought iron, and it is doubtful whether we shall this year produce 1,000,000 tons. The comparative and relative circumstances of the three branches, on the assumption that there will be the same output for the second as that ascertained for the first half of the present year, would probably come out much as follows:

	1882. Tons.	1894. Tons.
Wrought iron	2,841,000	1,000,000
Bessemer steel	1,673,000	1,620,000
Open-hearth steel	436,000	2,043,000
Total	4,950,000	4,663,000

This would show a larger output in 1882 to the extent of 287,000 tons. But it is tolerably certain that the make of open-hearth steel in the second half of the year will be considerably under that for the first half, inasmuch as for more than three months almost all the works in Scotland have been idle, owing to the strike of miners there, and it need hardly cause surprise if the output for the year falls considerably below 2,000,000 tons. Nevertheless, whatever the absolute figures may be, the tendency of the movement is sufficiently apparent. The wrought iron trade has declined, and the open-hearth steel industry has largely taken its place. To a considerable extent this has been done in the same centers of industry. Scotland, which formerly produced nearly 300,000 tons of wrought iron annually, now produces nearly 600,000 tons a year of open-hearth steel. Wales, which formerly produced over 500,000 tons a year of the old material, now produces nearly 200,000 tons a year of the new in the form of open-hearth steel and an almost equal quantity of Bessemer steel. The Cleveland district, which produced not much more than 12 years ago close on 750,000 tons of finished iron a year, now produces less than a sixth part of that quantity, but the difference has been made up by an output of Bessemer steel to the extent of over 200,000 tons and of open-hearth steel to the extent of about 315,000 tons. Staffordshire has been much more conservative. As recently as 1890 this county still produced 704,000 tons of wrought iron, and, while it is expected that the output for the current year will not be over one-third of this quantity, the difference has only been made up to the extent of about 60,000 tons a year by the steel manufacturer. South and West Yorkshire, Shropshire and Derbyshire—all of them old centers of the wrought iron trade—cling more tenaciously to that industry than the more modern centers, and appear less disposed to introduce the age of steel, although they, too, have made movements in this direction.

The economic results of the great change referred to have naturally been of a highly important character. Roughly it may be stated that two-thirds of the puddling plant constructed in all these several districts has been rendered worthless, except as old iron, and as this would mean the demolition of about 5,000 puddling furnaces, each of which, with its accessory machinery, is estimated to have cost £1,000, the total loss would not be much less than £5,000,000. On the other hand, there has been the expenditure incurred in providing the new steel producing plant required to take the place of the old wrought iron forges, and this can hardly be put at less than £1,500,000 for open-hearth works alone. To a large extent, therefore, the trade has grievously suffered by the change, but what the trade has suffered the public has more than gained. Bessemer steel rails have for many years past been produced at about half the price of wrought iron rails, and yet they last four or five times as long. Steel ships are built with much lighter scantlings than were permitted in iron, and are thereby both cheaper and more effective in carrying power, while they are less liable to accident and enjoy a longer average life. And so on all through. But perhaps the greatest change of all has come to the workmen themselves. The heavy and brutaliizing work of the puddler has been displaced by much more easy and rational labor—so far as labor is required. We make this latter reservation because it is not the least important of the many changes recently introduced that the same quantity of steel can be produced with about one-fourth the amount of labor required in the older industry.

The New Steel Plant and Railroad Rates.

The building of a large steel plant at Youngstown, O., now nearly completed, has attracted the attention and provoked the criticism of several technical journals who see in it only an increase of the already too large facilities in this particular branch of industry. It is conceded that in the matter of location the point is an ideal one, but the critics construe it as an attempt either to deprive present plants of their trade or else create a still greater excess of capacity, which will tend to result in a still further reduction of the working time in all the mills. Shortly after the act to regulate commerce was made effective it was pointed out in these columns that one inevitable effect of the law would be the removal of industries to points where the cost of the raw material, of manufacture, and of transportation to the consumer would aggregate the least sum, Niagara Falls being cited as an illustrative location for the manufacture of flour. It is probably true that there are a sufficient number of steel mills in the country to supply all needed product, but it is also undoubtedly true that as compared with the location of this last enterprise many of the mills are so situated as to be unable to compete upon equal terms. The act to regulate commerce is by most persons supposed to possess little interest to others than railway officials, but as its workings become better understood, and its principles are shown to be more generally controlling, it will be found by manufacturers to constitute a very profitable study, particularly by those who, because of railroad subsidies or other extraneous influences, have been misled into locating their plants at unnatural points.—[Railway Review.

THE manufacturers of cold rolled steel, in the United States, are forming an organization for the purpose of regulating some of the untoward developments in their trade. The meeting was called for Oct. 24, in New York. Wilmot, Hobbs & Co., of Bridgeport, Conn., are prime movers in the new organization. Better prices are the chief object. Among Pittsburg manufacturers who have part in the preliminary steps are Jones & Laughlins, Singer, Nimick & Co., Wm. Clark's Sons & Co., Morris Bailey & Co., and the Superior Steel Co. The uses of cold-rolled steel have been rapidly increasing of recent years.

IT is now claimed that the corrosion of pipes by electric railway currents is not due to the direct electrolysis of the iron of the pipes, but to the attacks upon the iron of the acid set free from the chemical compounds in the soil. Thees chemical compounds in the soil are the soluble salts of ammonia, potash and soda, and they are electrolyzed (i. e., chemically broken up into their constituent parts of acid and base) by the street railway currents. The freed acid then attacks the iron pipes, and causes the corrosion which has so frequently occurred. Thus the railway currents cause corrosion through electrolysis of the salts of the soil and not through electrolysis of the pipes direct.—[Railway Review.

THE Canton (O.) Rolling Mill Co., all the members of which are sheet mill workers, put out 105 tons of finished sheets in six days last week. The average output for their two-mill plant is 75 tons a week. The mill is kept busy with orders from local roofing concerns.

THE production of pig iron in Belgium for the month of September, 1894, amounted to 77,700 tons, as against 58,200 tons in September 1893. Total production for 9 months 1894, 670,440 tons as against 523,800 tons for the corresponding period of 1893.

THE Brier Hill Iron & Coal Co.'s furnace at Youngstown, O., has been making an unusual output of late. On one day last week it ran 300 tons—the largest daily output on record at a Mahoning valley furnace. The total for the week was 2,000 tons.

MACHINE SHOP AND FOUNDRY.

IMPROVED DRILLING MACHINE.

The drilling machine, of which an illustration is given, together with a sectional view of its special mechanism, is the work of Christian H. Baush, of Holyoke, Mass. It is a post-radial drill, and the improvement is in the means of pivotally mounting the arm on the vertically adjustable support; in the feeding devices for moving the carriage in and out upon the arm, and in the supporting engagement of the spindle-driving pulley with the carriage. In addition to the general perspective view given in Fig. 1, there is in Fig. 2 a plan view of the vertically movable support and the horizontally swinging arm, the carriage for the drill spindle with the carriage-feed devices, the driving belt and pulleys, and the belt tightening

trically of the cylindrical hubs or bosses, *d*, which are upwardly and downwardly extended from the top and bottom of the inner extremity of the arm, D.

There is a ledge or shoulder, *c*, (Fig. 3) at the base of the upper boss, *d*, upon which rest the lower ends of the series of rollers, *f*, which fit within and fill the annular space between the periphery of the boss and the circular wall of the bracket-socket. A like series of rollers, f^2, fills the annular space between the lower boss, *d*, and the bracket-socket. The end of the lower boss does not extend downwardly to the lower face of the bracket, *b*, b^2. An annular plate, *g*, of iron is supported next below, but usually not in actual contact with the under face of the lower bracket, its maintenance being by the heads of the durable bolts, g^2, the shanks of which pass upwardly through the ring-plate and with a screw-engagement into the bracket. The upper face of the ring has an annular groove, g^3, which is under the end of the lower boss, *d*, and in which is sunk a hardened steel ring, g^4, while the series of balls rest upon this ring with their tops protruding above the surface of

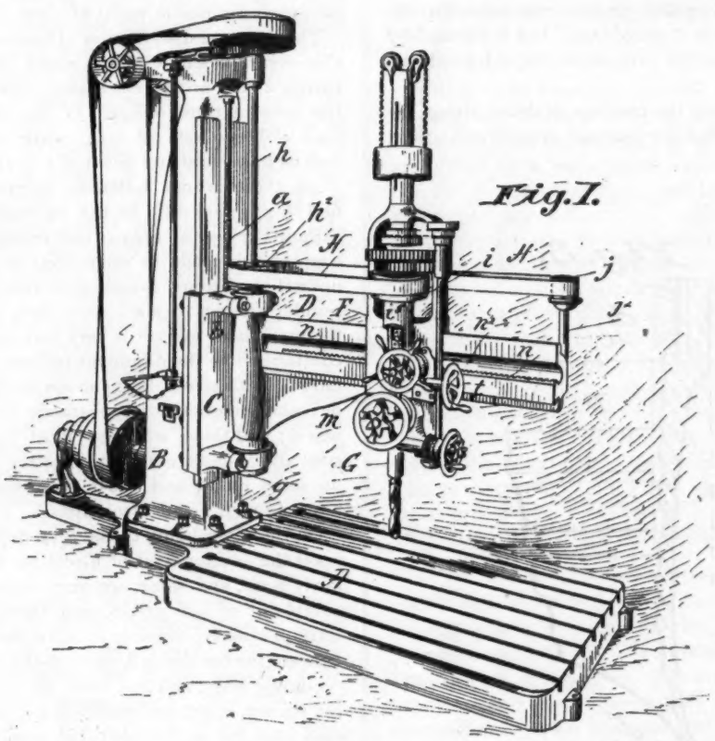

Fig. 1.

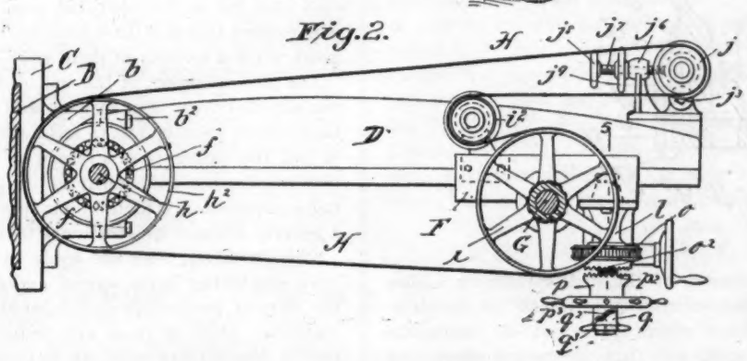

Fig. 2.

device. Fig. 3 is a vertical sectional view through the inner end of the arm and the portions of the arm-support with which the arm has engagements, this view also showing the ball and roller devices.

A represents the bed or base of the machine, B the standard or post, C the support which is vertically movable on the post, as controlled by the screw-shaft, *a*, as usual in drilling machines. D is the arm which is pivotally mounted for its horizontal swinging movement on the arm-support, C, while F is the carriage mounted for its feed movement longitudinally of the arm, the drill spindle, G, being rotatably and vertically mounted in and through the carriage. The arm-support, C, has the upper and lower horizontally extended brackets or arms, *b*, *b*, with semi-circular openings which, together with the caps or straps, b^2, have the circular openings for the reception concen-

the ring-plate and support the weight of the arm, D, through the medium of the hardened steel ring, g^6, interposed between the tops of the balls and the bottom of the lower boss. Wear, which takes place in the ball-bearing support for the arm, may be automatically taken up by the setting of the bosses, *d*, *d*, of the arm within the bracket-socket, since the shoulder, d^2, above the lower boss, and covering the socket in the lower bracket, is not in contact with the bracket.

In a 14-ton drill constructed with the arm mounted with the ball support and roller bearings as described, it is possible for a person with one hand to swing the arm and its equipments with very little exertion.

The pulley, *j*, is mounted at the upper end of a post, j^3, which is an upward extension of a horizontally swinging arm, j^3, which has journal-supports in the horizontal bracket-arms,

j^4, j^4, which are secured to the extremity of the arm, D. There is another bracket-arm, j^5, supported by the arm, D, adjacent the said swinging arm, j^3, through which is passed, with a screw engagement, the screw-shaft, j^7, having the hand-wheel, j^8, whereby it may be turned to derive endwise movements in the one or other direction, working against the swinging arm carrying the pulley, j, and serving to insure any desired degree of tension upon the belt. If the work in hand is heavy, using a large drill, the pulley, j, is forced to the right, as viewed in Fig. 2, and the belt-tension is correspondingly increased; if on the other hand the work requires a smaller drill, or is comparatively light, the screw is reversely turned and the pulley, j, assumes such a position as permits the belt to run comparatively slack. The part indicated by j^9, is substantially a nut having a screw-engagement upon the screw-shaft and having its face or hub-end in bearing against the contiguous face of the bracket arm, j^6; this serves as a lock-nut. The greater the tension upon the belt the greater the strain upon the pulleys, especially the drill-spindle-pulley, i, but in the construction described and shown the lateral strain upon the pulley is not transmitted to the drill spindle so as to throw it "out of true," but is resisted by the socketed part of the carriage into which the extended hub of the pulley is set.

The mechanism for feeding the carriage endwise along the arm D, is changeable so that the carriage may have a quick

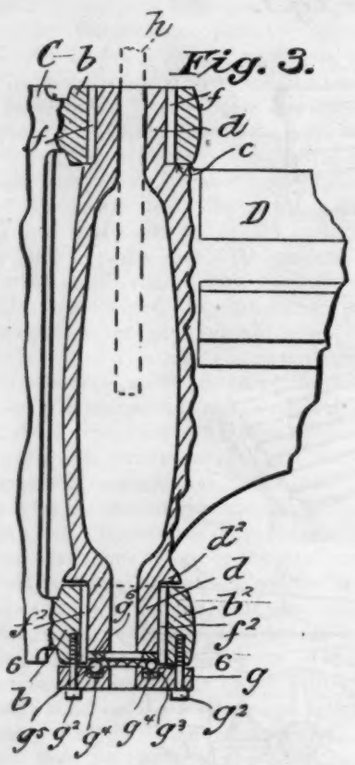

Fig. 3.

movement for long traverses of the drill-spindle or a slow movement for short and accurate adjustments of the drill-spindle. When the clutch sleeve, p, is out of clutch, the rotation of the worm-shaft will turn the worm-wheel, but without effect, to rotate the shaft to feed the carriage, but when the clutch sleeve is out of clutch the direct and quick feed movement may be imparted to the carriage by turning the shaft by means of the hand wheel, p^3, the worm-wheel remaining stationary. And again, when the clutch sleeve is in clutch the carriage is locked on the arm, because the shaft having its bearings in the carriage has the pinion engagement with the rack of the arm and because the shaft cannot be turned with the worm wheel against the worm. However, the purposed rotary movement of the worm will insure the movement, very slowly, of the carriage along the arm, as desirable for bringing the drill spindle to close adjustment for its work. And while the drill is working and no change being permitted to the adjustment as effected by the worm, by rotating the worm-shaft, the carriage will be positively held, so that the tapered point of the drill, for instance, when working into a hole could not serve to force the carriage laterally of the length of the drill.

A machinist may most quickly and easily change the feed from the quick to slow while using the drill by employing one hand to turn the cam-slotted sleeve, q, and the other to turn the worm-shaft. By employing a rotary mill upon the end of the drill-spindle and using the slow-feed such work as grooving or slotting may be readily performed.

THE OUTLOOK FOR MACHINERY TRADE.

The present prevailing dullness amongst machinery builders presents some curious phases, especially in what may be called its distribution. If one goes among certain classes of machinery builders and dealers he will hear practically nothing but the most discouraging reports as to present business and the prospects of an improvement; while at the same time others are quite busy, have all the orders they can conveniently take care of, and look to the future from the most cheerful—even optimistic point of view.

This unequal distribution of business is sometimes observable even in a single shop, where the business is somewhat varied, a very prominent machine tool establishment being at the present time obliged to run some departments double time with two sets of men, while other departments are so dull as to be shutting down at 4 P. M.

All those whose business depends largely upon railroads find things very dull, as the railroads are generally doing as little in the way of repairs and renewals as is consistent with keeping the roads in operation; and as the railroads, under normal conditions, absorb such a very large proportion of the regular product of machinery, their practical withdrawal from the machinery market is very seriously felt, and will probably continue to be the dominant influence until some turn of affairs in Wall street, heavy crops in the West, or sheer wearing out and practical disappearance of equipment compels renewal; and those who are most familiar with practical railroad affairs declare that this latter condition is approaching on some roads, and must soon make its influence felt by "supply men" and machinists.

On the other hand, those who depend for business mainly upon the development of electrical matters are finding trade fairly good, and some are very busy, though there is much complaint of low prices, and these will probably continue until productive capacity is more nearly balanced by demand. One engine builder informed us the other day that he was exceedingly busy, and had been all summer—was now running his shop at night and employing a double shift of men. Not only this, but he declared that nearly all the engine builders who pushed things a little were finding business at least fairly good, while a number of them were quite busy.

The general aspect of the machine tool industry is not especially cheering. For reasons well understood, machine tool builders are usually first to feel a decline in business and last to feel the influence of a return of prosperity, because business must revive sufficiently to bring practically all the existing equipment of machine tools into use before there can be a general demand for additional tools.

This, however, does not apply to those tool builders who have something in the way of a specialty designed to reduce the cost of production as compared with standard tools and methods. Most of these are finding plenty to do by simply letting people know what can be accomplished by the adoption of their methods and machines.

As indicating the very wide field and the multitude of opportunities for putting in electric installations, including engines and boilers, an engine builder recently put into a single apartment house, in this city, four engines aggregating 400 horse-power, and in another case of a large building in a nearby city, which had been heated by steam and lighted by gas, the boiler plant was improved and fitted for higher pressure, engines and dynamos put in for lighting, and, by using the exhaust steam for heating, both heating and lighting is now done on a smaller consumption of coal than was formerly required for heating alone. Of course in this case the work was done under the direction of a competent engineer; which is always an important requisite where the best results are wanted, but when such results are possible it

indicates that there are many places where engines ought to and probably will go in soon.

In this connection should also be mentioned the fact that those machine builders who have, in recent times, taken some pains to cultivate foreign trade have generally been in much the best condition during the dull times, some of them finding their foreign business nearly, if not quite equal in volume to the home trade.—[American Machinist.

OVERDOING MACHINE MAKING.

Some inventors are so exceedingly jealous of their own powers that when they have invented and patented, say, a coal shovel and undertake its manufacture, they must not only make the shovels, but make also the machines to make them. No ordinary machine will answer for cutting out the blank. It must be one of their own invention. Indeed the metal must be rolled on a set of rolls which they have invented, different from anything that is made in any part of the world, and, if they could have their way, they would have their own iron mine, have a blast furnace of their own design, built from their own specifications, would work the metal in their own puddling furnaces—in fact, would not allow the ingenuity or inventive powers of others to diminish in any way the credit which should accrue to them from the invention of their remarkable shovel. This foolish idea, of not only inventing the thing but of inventing also the machine or machines to make it, is one of the rocks on which not a few companies have been wrecked. It is not necessary for every man to invent every piece of machinery that he puts into his factory, for the chances are that other inventors and other men have built just such machines as are wanted, and have made them a great deal better adapted to the work than would be possible for what may be called an amateur inventor. Captain Ericsson once said, in substance, that when other men have devoted much time and labor to a problem, their solution is much better than can be obtained by any single individual. Wisdom, then, dictates the accepting of the machines already perfected rather than, for the sake of originality, trying to find a substitute.—[Cassier's Magazine.

SHOP AND FOUNDRY NOTES.

Speaking of properly housing in dangerous machinery cannot but call to mind the many danger points that we all know of in hundreds of shops, and which could easily be done away with were those precautions taken that at once suggest themselves to any one. We have a lesson to learn from the shops of France and Germany that it would be well to heed. There, one never sees a gear wheel running bare where there is the slightest chance of its catching the clothing of an operator. Everything is housed, gearing, belting, reciprocating rods, and all moving parts that project beyond the floor line of the machine, or that can in any way serve to threaten the safety of workmen. The employers' liability insurance companies have done a deal towards bettering the conditions existing in our own shops, but there is still room enough for every proprietor to do a little missionary work in his own establishment.—[Dixie.

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The old adage of the longest way around being the shortest way home, is especially exemplified in the cases of those who are building new machinery with and without drawings. I well remember the saying of a master mechanic for whom I was at one time the draughtsman. When I would be puzzling over a difficult piece of work that seemed to have the faculty of presenting endless obstructions, and would make an apologetic remark about the time I was spending over it, he would say: "Yes, but just think how much more it would cost to discover all of these difficulties in iron and steel than it does on paper." It is a difficult thing, however, to persuade the man who has one machine to build that there will be an economy in having a drawing made; economy in both time and money. I happen to have had two recent cases of this sort of work. In one a man had a complicated network of stuff that had to be made in eight different places and assembled in a ninth. In five weeks from the time the order was given to the draughtsman the work was all in position and fitted like the paper on the wall. At the same time another party started in to build a simple sort of a machine "out of his head." He was out of his head, if my readers will excuse the pun. After twelve weeks' work the machine was so far completed that it could be tried, and was found to need remodeling for the whole of the last eight weeks' work. A competent draughtsman now has the matter in charge, and a couple weeks will probably see the apparatus in successful operation. Drawings invariably pay for themselves, and the difficulties that always exist in every new piece of work are sure to be run to earth when the work is put on paper, and paper is cheaper than steel and iron.—[J. H. Allen.

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A stove foundryman writes: "It often happens that an iron is blamed when it runs uneven, when the trouble is really due to the atmosphere. One day it is bright, clear, and dry and the iron runs nicely. The next day is damp. For instance, the molders may have wet down the sand for a very dry day. If it be damp, it may not have dried out and it gives an imperfect casting. It is the iron, not the weather, that is blamed. Foundrymen should study this phase of their work more than they do."

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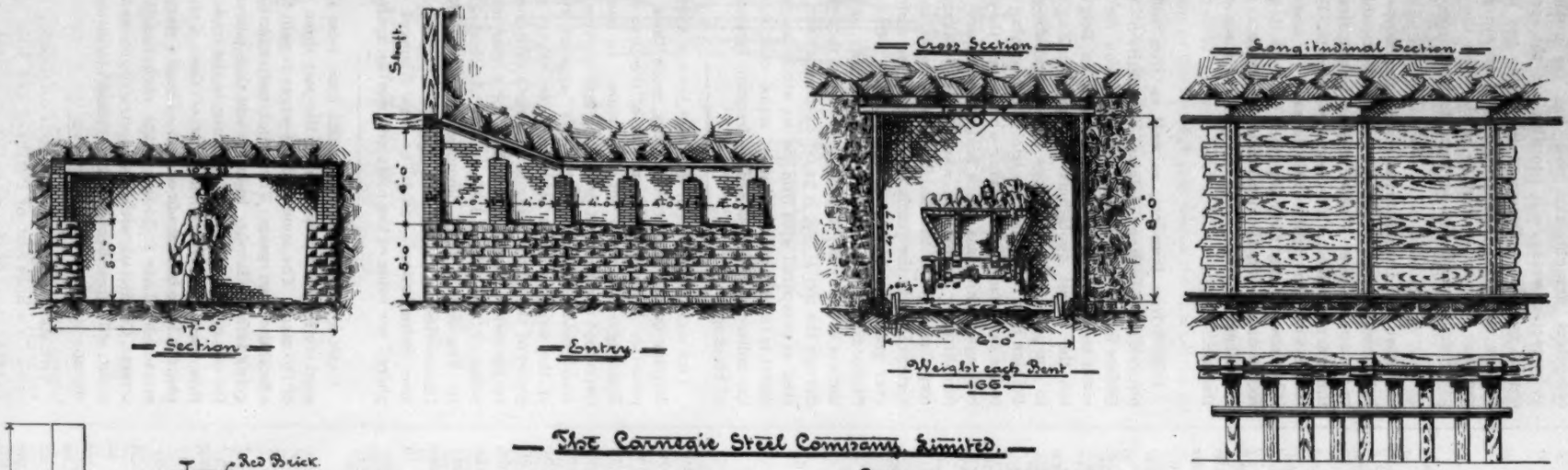
British iron founders, as well as iron and steel works owners, are finding Belgian competition uncomfortable. Orders for castings of best malleable iron for mill and forge machinery have been placed recently in Belgium at £15 per ton, the lowest quotations obtainable in England being £17 to £20 per ton for castings of corresponding quality. The Belgian iron founders have lately been turning their attention to the manufacture of driving wheels, and they are producing castings in this class which favorably compare with best Staffordshire or Derbyshire work. The breakages of mill and forge castings in the finished iron works constitute a very serious item in the yearly expenditure for maintenance, however good the quality of the castings. One or two leading Staffordshire ironmasters have been trying, as an experiment, the use of best steel in place of iron for this purpose, and although the initial cost is heavy by comparison, the "life" of steel as compared with iron, is so much longer, the ultimate result is favorable in point of actual cost, to say nothing of the indirect loss occasioned by frequent stoppages on account of breakage.

THE second number of the *New Science Review*, the Philadelphia quarterly started in July, more than bears out the promises made by the contents of the first issue. "Mental Training—A Remedy for Education" is one of the most important and thought-provoking articles from an educational standpoint. "What Electricity Is" appears without the name of the writer, who is said to be an expert electrician, the object of the editor being to stimulate criticism by electrical authorities, promising the name for a later issue. "What is Science?" "Sanitary Delusions," "A Remarkable Book and Its Teachings," (Mrs. Bloomfield Moore's "Keeley and His Discoveries)," "The Battles of Science," "The Newest Explosive—Schnebelite" and "The New Element of the Atmosphere," are some of the more noteworthy contributions.

LANE & BODLEY, of Cincinnati, have now about the same working force employed as for the past three months, a total of 150 men. The same scale of wages is paid that has been in effect the past year. They find indications that capital is going into the lumber industry and that power requirements for saw mills are more of a feature in the trade than for some time past. Several good sales of their Columbian Corliss engines have been made of late. The six story building to be erected by Lane & Bodley at the corner of Water and John streets, Cincinnati, with its electric light and power equipment, will give them much increased facilities for manufacturing.

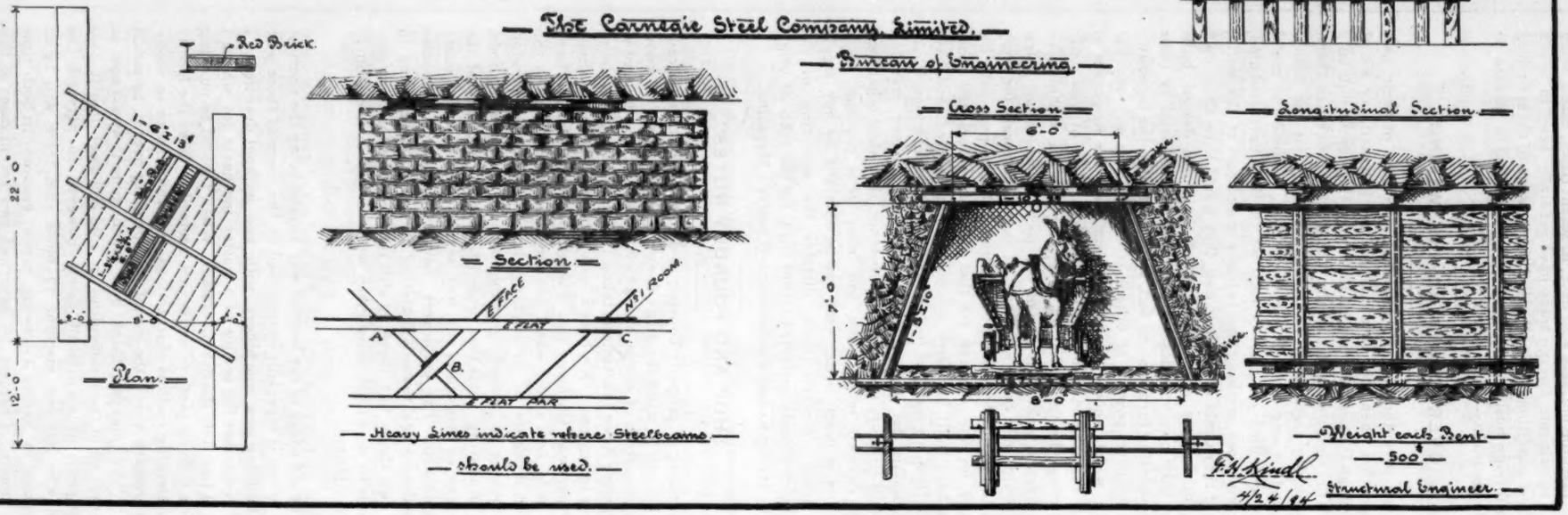
THE statement of coal and coke originating on the Pennsylvania Co.'s lines east of Pittsburg and Erie shows a total of 12,127,972 tons in 1894 up to Oct. 13 against 14,588,508 tons in 1893 to the same date, a decrease of 2,460,536 tons. Considering that the long coal and coke strikes came this year and that the statement for 1893 includes five months of more than average prosperity, the showing is surprisingly good for this year.

Proposed use of Steelbeams in Mines to replace Wood Platform, Cross Sills etc.



The Carnegie Steel Company, Limited.

Bureau of Engineering.



THE USE OF STEEL BEAMS IN MINES.

The great reduction in the cost of steel beams which has come in the past two years has been an important factor in extending their use for supports in ordinary mining. The accompanying sketches show the application of beams for the support of the upper strata, sides of entry shafts, shaft bottoms and main entries in coal mines.

To appreciate the adaptability as well as the economy the shape of the I-beam should be taken into consideration, admitting as it does of the insertion of timber sheathing between flanges, as shown in drawings, thus avoiding bolting, etc.; its ease in putting in place and removal when necessary, and its lightness in weight and smaller size as compared with timbers of equivalent strength. Our sketch shows bents of 4-inch 7 lb. per foot beams, these being equivalent in strength to the 60 lb. per yard rail used for this purpose.

Comparing these in cost: A bent of a 4-inch steel beam would weigh 166 lbs., which at 1.3 cents per lb. would cost $2.16. The same style of bent, using 60 lb. old rail, would weigh 465 lbs., and taking price at $15 per gross ton would make the cost $3.11. We make no comparison here with timber, as its price is largely a matter of proximity to supply and at the present time perhaps in many localities the timber supports are cheaper than the steel beams. However, at the present rate of destruction of standing timber it will be a matter of but a short time before the beams will be decidedly cheaper, in addition to their other advantages.

Steel beams would be good as long as the mine is worked and they have the additional advantage that they can be taken to the surface upon the abandonment of the mine and used over again or sold for scrap. With this in view, the design admits of their ready removal, the beams being kept in place by spikes driven through holes punched in their webs as shown in the sketch. The 4-inch beam bents could be placed from four to 12 feet apart, depending upon the condition of the overhead strata. There is one situation, however, in this connection in which steel beams are now cheaper than timber, in addition to being better adapted for the purpose, and that is for safe supports over the main entrys.

In the sketch representing the main entry, in which masonry abutments are shown, the overhead strata are supported by 10-inch 30 lb. per foot steel I-beams, the supporting beams extending about 100 feet from the shaft into the entry. This is particularly adapted to the larger mines, where several entries converge and where pump rooms, stables, etc., are necessary, the advantage gained being the increased safety in supporting the entire upper surface by means of one span, instead of dividing the space by upright timbers or extra heavy timbers spanning the opening. The small diagram on the same sketch shows how the steel beams could be used to advantage where one entry crosses another. To prevent possible corrosion the beams could be dipped in hot tar or other preventives.

These sketches show in a general way the application of beams to this purpose. Their adaptation to special cases would be subject to the conditions surrounding the particular operation. These could be fully provided for by varying the plans to suit the case in hand. Steel beams are already in use, on the plan outlined above, in the mines of the H. C. Frick Coke Co., in the Connellsville region.

THE Consolidated Safety Valve Co., of New York, has asked to have a receiver appointed for the Butman Furnace Co., of Chicago, making the charge that the defendant company has allowed judgments to be entered against it for $6,000 in favor of the Variety Iron Works of Cleveland, O., in order to give a preference over other creditors. The Consolidated Safety Valve Co., has a judgment against the Butman Co. for $227.

THE award given the Cleveland Twist Drill Co., on its exhibit at the World's Fair reads as follows: "Most extensive exhibit and greatest variety of well made twist drills, exhibited as they are manufactured and furnished to the trade. The workmanship on all of these drills is of the highest order, and especially meritorious are the twist drills in millimeter diameters."

Machinery, the new monthly, New York, has started well.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

E. V. Harrison, Clarksville, Tenn., will want a carload of No. 1 steel roofing.

Thomas Bailey, Athens, Ga., will buy complete equipment for foundry and machine shop.

The C. & S. Mfg. Co., Claremont, Va., will buy engine and boiler, belting, iron roofing and pulleys and shafting.

Buyers, who may be addressed through lock box 102, Erie, Pa., are in the market for a second-hand 6-foot or 8-foot boring mill.

S. M. York, Cleveland, is in the market for a second-hand gas or gasoline engine, and for second-hand iron working machinery.

New Construction:—

Work has been commenced on the duplicate plant of the Wright Shovel Co., of Anderson, Ind.

The Whitely Reaper Works, of Muncie, Ind., which burned some time ago, will be rebuilt in the near future.

D. Saunders' Sons, Yonkers, N. Y., have commenced the erection of a four story brick addition to their factory.

Contracts have been let for the buildings of the Riverside Agricultural Implement works, of Anderson, Ind., to be completed by February 1.

John R. Saylor and Richard Stillman will build a new machine shop at Pottstown, Pa., and will shortly be ready to do business under the name of the Pottstown Machine Co.

Geo. R. Lombard of Augusta, Ga., has incorporated his business under the name of the Lombard Iron Works & Supply Co., capital, $100,000. A new boiler shop will be built.

The Utah Furnace & Mfg. Co., of Ogden, Utah, will build a charcoal blast furnace and pipe foundry. The furnace will utilize the deposits of specular and brown hematite ores near Ogden and Willard, Utah.

The Coe Brass Mfg. Co., of Torrington, Conn., are increasing their boiler equipment and have almost completed a new boiler house. In this building they are to use boilers designed by the Bigelow Boiler Co. The Coe company will handle their coal from the storage to the boiler rooms by an equipment of narrow gauge cars and track designed and manufactured by the C. W. Hunt Co., of New York.

Fires and Accidents:—

The plant of the Anderson Tack Co., Rockland, Mass., has been destroyed by fire.

The mill of the Standard Horse Shoe Co., South Wareham, Mass., was destroyed by fire on Oct. 7, with a loss of $30,000. The works will be rebuilt.

At Richmond, Va., a large part of the extensive plant of the Tredgar Iron Works was destroyed by fire, Oct. 18. The horseshoe, blacksmith, pattern and car shops and numerous sheds were consumed. Loss about $150,000, covered by insurance.

One of the engines at the Twenty-second st. pumping station, Chicago, was disabled by a serious accident of last week. The crank shaft was broken in two close to the joint, necessitating its being replaced entirely. As a new shaft will have to be forged it will probably be three weeks before the engine can be started again.

Additions, Enlargements, Removals, Etc.:—

Chapman Valve Co., of Indian Orchard, Mass., will build an addition 185x120 to its foundry.

The Lamar Iron Works, Lamar, Mo., will enlarge their present plant in the near future.

The Hartman Mfg. Co., of Ellwood City, Pa., have let the contract for an addition to their plant.

Muncie, Ind., Iron & Steel Co. will build an additional building 130x60 feet, for busheling furnaces, muck train and engine.

The Fulton Iron Works, of St. Louis, Mo., will build an addition to their present plant, 56x67 feet, two stories high, to cost $8,000.

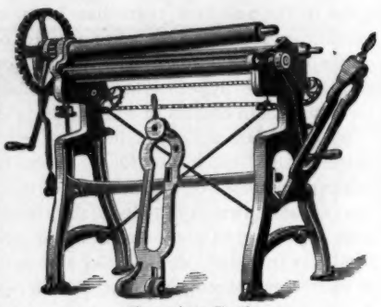
MACHINES FOR WORKING SHEET METAL

Patent Gap Shears.

Patent Gap Shears, Especially designed for Squaring, Trimming and Slitting. 6 to 18 inch throat for Slitting Wide Sheets. Complete for Tin or Iron to 14 gauge. Seven Styles of various lengths HAND AND POWER

General Purpose Punch and Shear. Seven Sizes.

Rear Side.



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General Purpose Forming Rolls, all sizes. Quickly adjusted and instantly opened—A Revolution. Also Patent Crimping Rolls. Beware of Infringements.

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With all orders for Rapping Plates we now send markers for bit centers without extra charge. Try them and save your patterns and money.
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MILWAUKEE FOUNDRY SUPPLY COMPANY,

Successors to D. Fraser Mfg. Co. and Eagle Pattern Wks.

MILWAUKEE, WIS.

The Filer-Stowell Co., of Milwaukee, have let the contract for an addition to their present plant 140x80 feet, to be completed in two months.

The Cambridge (O.) Iron & Steel Co. is enlarging its galvanizing plant to double the present capacity. The company will also add two sheet mills in the near future.

Reeves Bros., of Alliance, O., are pushing work on an addition to their boiler and tank plant, expecting to have it completed in a few weeks. The main shop is 250x100 feet.

Arrangements have been made by which the Newark, (O.) Machine Works will be returned to Newark from Columbus. A $10,000 bonus is the consideration. Agricultural implements are the product.

General Industrial Notes:—

Vitrified Wheel Co., of Enfield, Conn., have increased their capital stock to $100,000.

At Youngstown, O., the Youngstown Steel Co.'s wash metal plant is again in operation.

Portage Iron Co., Ltd., Duncansville, Pa., has resumed in all departments on double turn.

Wm. Yates & Co., of Pittsburg, expect to have their new machine shop in operation within a week.

Burgess Steel & Iron Works, Portsmouth, O., will be put in operation as soon as repairs are completed.

Fowler Bolt Works, of Anderson, Ind., which have been shut down for two years, have started up on full time.

The Henry R. Worthington Co. has declared a semi-annual dividend of 3½ per cent on the preferred stock, payable Nov. 1.

Creditors of Lansing Iron & Engine Works, Lansing, Mich., have asked O. M. Barnes, holder of the mortgage, to foreclose.

The Beaver Tin Plate Co., which is to put up a plant at New Lisbon, O., has increased its plans from a four-mill to a six-mill plant.

The promoters of the National Tin Plate works which are to be erected in North Anderson, Ind., have just purchased their equipment.

The American Tube & Iron Co., Pittsburg, has taken a contract for a round lot of pipe for the Midland Steel Co., of Muncie, Ind.

Striking tin plate workers at Pittsburg are talking of putting up a mill at Hyde Park, Pa., and running it on the co-operative plan.

It is expected that the James P. Witherow Co. will succeed in negotiating a loan, and that the plant at New Castle, Pa., will be started up shortly.

Twenty-five additional men have been put at work at the Elwood (Ind.) Steam Forge, and it is expected that the full capacity will be used by the end of the year.

At Gas City, Ind., the hot roll department of the Morewood tin plate mills closed down. The management proposed a 25 per cent. reduction, which the men refused.

The Sparrow's Point plant of the Maryland Steel Co. is expected to resume Nov. 1. Three thousand men were employed when the works shut down last year.

The Shenango Valley Steel Mill at New Castle, Pa., rolled 248 tons of steel, in an 8-hour turn last week. The highest previous record for the time specified was 232 tons.

Andrew Hopkins, John R. Cavanagh, B. J. Derlin, P. C. Byrne and Joseph Hawley incorporated the Western Mfg. Co. at Pittsburg, for the manufacture of articles of iron and steel.

The Monongahela Tin Plate Co. has been incorporated. It is reported that it will purchase the South Fifteenth st. mill of the Oliver Iron & Steel Co., Pittsburg, and turn it into a tin plant.

David Lamar, Lynchburg, Va., has purchased the rolling mill, furnace and other property of the Virginia Nail & Iron Works at $35,000. The property is located at Reusens, and over 300 operatives will be employed in the near future.

The Porter Iron Roofing Co., at Anderson, Ind., has passed into the hands of Messrs. F., B. and W. F. Gedge, W. H. Porter disposing of his interest. It is reported that Mr. Porter is planning to erect another corrugated iron works in Anderson.

Wheeling steel workers met last week to determine their attitude toward the reduction in wages expected at the opening of the new year. It was decided that while the men are not able to stand a further cut they are not prepared to make a fight.

The Turnbull-Cullerton Roofing & Metal Lath Co., of Chicago, assigned last week Wednesday to Howard Wagner. Assets were placed at $51,700 and liabilities at $22,500. The failure was occasioned by the depression in business and inability to make collections.

The Bass Car Wheel Works at Lenoir City, Tenn., have been completed and will begin to make castings at once; capacity, 250 car wheels daily, besides soft castings, for which the equipment is complete. This is claimed to be the most extensive plant of its kind in the South. J. H. Bass, of Fort Wayne, Ind., is proprietor.

Goldsmith, Loewenberg & Co., of Portland, Ore., and New

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

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York, who are extensive consumers of tin plate have selected New Kensington, Pa., as the seat of their new tin plate plant. Several cities were visited, including Youngstown, O. The company will spend $300,000 on the new plant. Ten acres of ground have been bought and work will begin at once.

At New York in the U. S. Court of Appeals, Judge Shipman gave an opinion which is final, confirming the injunction granted by Judge Townsend, of the United States Circuit Court, a year ago against the New York Air Brake Co. in favor of the Westinghouse Air Brake Co. The opinion sustains the Westinghouse patent for quick action air brakes and engine valves.

A Newark, O., dispatch of Oct. 16 has the following: "At the citizens' meeting to-night, John E. Jones, of Chicago, and W. H. Parrish, of Washington, Pa., representing Chicago and Wisconsin capitalists, proposed to erect a $148,000 four-mill tin plate plant, providing Newark people will buy 400 lots. Sixty-five lots were sold, and it is thought little trouble will be had in disposing of the others."

J. Wood & Bros. Co., of Conshohocken, Pa., have posted a notice that on Monday, Oct. 22, a new scale of wages goes into effect: Puddling on basis of $3 per ton. Ordinary labor, $1 a day. Other wages, including sheet, bar and flue mills, uniform reduction of 10 per cent. Similar notices were posted at the Schuylkill Iron Works of Alan Wood Co. and the Conshohocken Tube Works. The latter have resumed after a six months' shut down.

A Hamilton, O., letter says that the Niles Tool Works, which when running at its full capacity employes 800 men is now working 300 men. Hooven, Owens & Rentschler are running, but with fewer men than usual and at a reduction of wages from the scale prevailing two years ago. The H. P. Deuscher Co. is employing practically a full force. The Long & Allstatter Co. received several good orders a short time ago and will probably employ its present force of men through the winter.

The American Structural Steel Co., E. M. Butz, president, will erect Bessemer and structural steel plant at Tonawanda, N. Y. The Cataract Construction Co., of Niagara Falls, has contracted to furnish the motive power. It is claimed that beams, channels and angles will be made at the cost of billets, and in such shapes as to reduce the cost of columns by one-half. This will be the first mill in the country to be wholly operated by electricity. The power will be drawn direct from the 5,000 horse-power generators.

Nine new tinning stacks were put in operation at the American Tin Plate Works at Elwood, Ind., last week, and a good force is now at work at the old scale, with the understanding that no reduction will be made unless made at other tin plate works. An Elwood dispatch says: "Elwood will soon have another tin plate factory, which is to be a four-mill plant It is being organized by a leading stockholder of the American tin plate plant, who wants to enter the business on a larger scale than at present, and it will be a joint stock company, composed of local capital. It will have a capacity of 2,500 boxes per week, and employ 250 men."

The Hendrick Mfg. Co., Ltd., of Carbondale, Pa., manufacturers of ice making and refrigerating machinery, hydraulic and filter presses, perforated sheet metals and screens, has recently enlarged its facilities by adding a 9½"x16"x12" compound condensing engine with belted air pump, supplied by B. W. Payne & Sons, of Elmira, N. Y.; a Newton No. 1 cold saw cutting-off machine; a 20-inch Prentice drill; a Woodward & Rogers 12-inch sensitive drill; a Hilles & Jones No. 00 combined punch and shear; a Hendey milling machine and a number of special tools of its own design. The company is busy in all its departments and has had a prosperous year. At present 150 men are employed. Other improvements are contemplated for the near future to meet the demands of a growing business.

A few weeks since the St. Louis School Board made an investigation of the claims made by the manufacturers of the Buffalo fan system of heating and ventilation. Telegrams of inquiry were sent to the school boards in Denver, Salt Lake City and Colorado Springs. The following are the responses as transmitted by the Western Union Telegraph Co.: From Colorado Springs, Col.—"Buffalo fans in high school here give perfect satisfaction and could not be more perfect in their work. We recommend them whenever absolute perfection in ventilation and heat is required." From Salt Lake City School Board.—"Buffalo Forge Co.'s heating and ventilating plants most satisfactory; in use of fuel most economical system we have adopted; four schools and one hospital working perfectly Buffalo system." From Denver.—"Buffalo fan system in Denver schools entirely satisfactory; most excellent in efficiency and economy; air always pure."

A LINE of through palace buffet sleeping cars between Chicago and New York City is placed at the disposal of the traveling public and runs over the Nickel Plate Road and D. L. & W. R. R.

Spanish Iron Ore Exports.

There was a great falling off in Spanish iron ore shipments to British ports during September. The amount was 253,964 tons, as against 302,503 tons in the corresponding month of last year and 279,397 tons in September, 1892. In spite of this decrease, the exports during the first nine months of the year to Great Britain show an increase over former years, having been 2,950,554 tons, as against 2,935,457 tons in the corresponding period of last year and only 2,563,633 tons in the first nine months of 1892. The total of iron ore exported from Spain during the eight months ending in August was 3,529,996 tons, as against 3,344,976 tons in the corresponding period of last year.

Punching, Shearing and Tensile Strength.

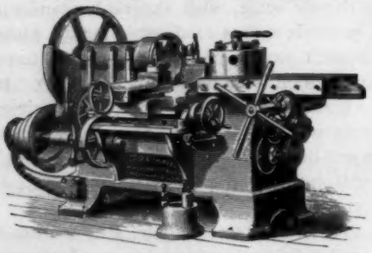
The investigation whose results were set forth by Capt. A. E. Hunt in a paper before the Engineering Congress at Chicago, last year, on the relation between shearing strength and tensile strength of structural steel, is thus referred to in the last issue of the London *Iron and Coal Trades Review*:

Some attempts have recently been made in the United States to use the shearing strength of steel as a measure of its suitability for constructional purposes, the first steps being taken by Capt. A. E. Hunt, who published his results in a paper read before the international conference in Chicago in 1893. The subject has been still further developed by Mr. Theodore L. Condron, a Chicago engineer, who, following the same lines as Capt. Hunt, proposed to use the force required to punch steel as a measure of its resistance, and attempted to show that the punching or shearing strength of steel bears a constant relation to its tensile strength. Although this latter purpose was not accomplished, it was clearly shown that the total force required to drive a punch through a piece of steel plate will be directly proportionate to the thickness of the plate and the diameter of the punch. The tests were thus valuable in showing just the opposite of what they were intended to do, namely, that while it is obviously near enough for all purposes to say that the shearing resistance is 75-80 per cent. of the tensile strength, yet no rule or law can be laid down establishing a constant relation between the two, nor does it seem probable that such a law will ever be discovered.

THE detailed report of the output of the Connellsville coke region for the week ending Oct. 13th, shows 15,036 active and 2,538 idle ovens, with a total estimated production of 142,699 tons. Compared with the production of the previous week, this was a decrease of 2,454 tons. In the active list of ovens there was a decrease of 80. The demand for furnace coke is holding up well. Shipments for the week aggregated 7,257 cars: To Pittsburg and river tipples, 2,021 cars; to points west of Pittsburg, 4,041 cars; to points east of Connellsville, 1,195 cars. Compared with the shipments of the previous week, this was an increase of 162 cars.

THE Nickel Plate Road now operates a through sleeping car service to New York City via West Shore Road, and on Oct. 7th daily buffet sleeping car service was inaugurated via Delaware, Lackawanna & Western R. R.

Dawson & Goodwin,
57 S. Canal St., CHICAGO.



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The Millie Iron Mining Co.,
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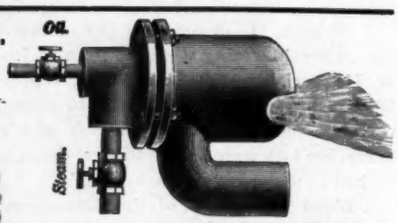

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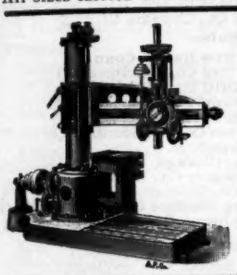

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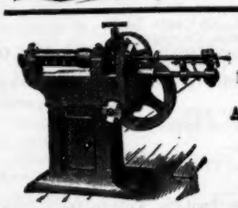

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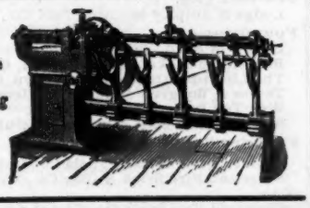

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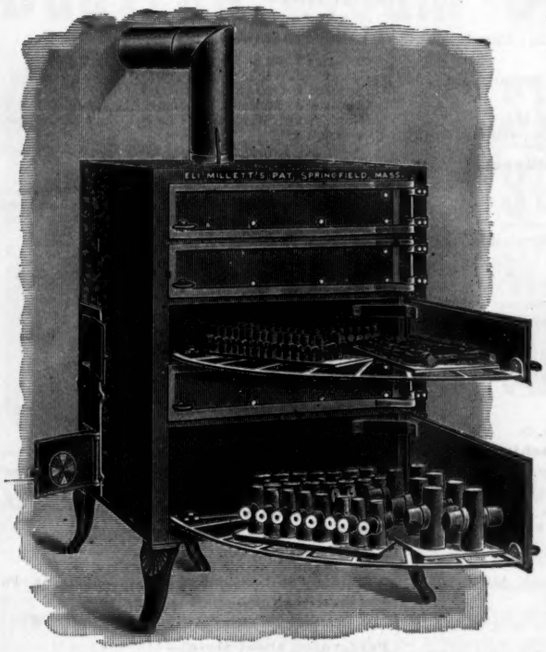

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Compound rest is 12" wide and 23" long on slides. Crossrail is 15" wide, 9" deep in center, 6" deep over Vs. There is a quartering attachment driven by separate countershaft on tailstock.

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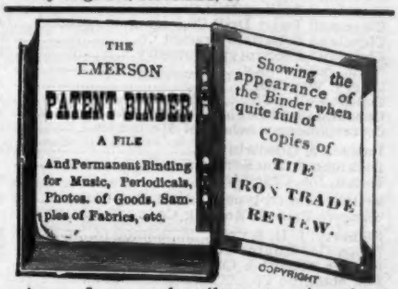

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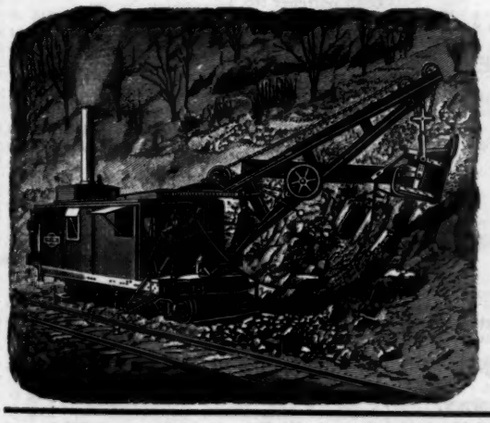

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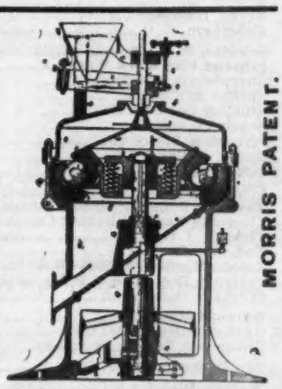

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No. 2 Foundry	10 50@ 10 75
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Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
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Local Scotch Foundry No. 1	10 75@ 11 00
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Local Scotch Foundry No. 3	9 50@ 10 00
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Southern Coke No. 2	10 50@ 10 75
Southern Coke No. 3	10 00@ 10 25
Southern No. 1 Soft	10 50@ 10 75
Southern No. 2 Soft	10 25@ 10 50
Southern Silveries No. 1	12 00@ 12 25
Southern Silveries No. 2	11 50@ 11 75
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Jackson County Stone Coal No 1	14 50@ 16 00
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" " Mottled	8 50@ 8 75
Standard Alabama Car Wheel	16 25@ 17 25
Tennessee " "	15 50@ 16 00
Lake Superior " "	16 00@ 16 50

BUFFALO (reported by Rogers, Brown & Co.)

No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 75
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 25
Ohio Softener No. 1	12 25
Jackson Co. Silvery No. 1	15 75@ 16 75
Lake Superior Charcoal	14 50
Tennessee Charcoal	15 50
Southern Soft No. 1	11 75
Southern Soft No. 2	11 25
Alabama Car Wheel	16 00@ 17 50
Hanging Rock Charcoal	18 50

LOUISVILLE (reported by Geo. H. Hull & Co.)

Southern Coke No. 1 Foundry	$10 00@$10 50
Southern Coke No. 2 Foundry	9 25@ 9 50
Southern Coke No. 3 Foundry	8 75@ 9 00
Gray Forge	8 50@ 8 75
Southaern Charcoal No. 1 Foundry	12 50@ 13 50
Car Wheel	15 00@ 15 50
Spathite	11 25@ 11 75

ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$10 75@$11 25
Southern Coke No. 2	10 25@ 10 75
Southern Coke No. 3	9 75@ 10 00
Southern Gray Forge	9 50@ 9 75
Southern Charcoal No. 1	14 00@ 14 50
Missouri Charcoal No. 1	12 50@ 13 00
Ohio Softeners	14 00@ 14 50
Lake Superior	15 50@ 16 00
Southern	16 75@ 17 00
Connellsville Coke, St. Louis	4 50

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$12 50
Old steel rails	10 00
	NET TONS
No. 1 R. R. wrought scrap	$ 9 50
No. 1 wrought scrap	8 50
No. 1 Machine cast scrap	8 50
Iron axles	15 50
Axle turnings	8 00
Wrought turnings (free from cast)	6 50
Cast borings	5 50
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 00
Tank iron	6 75
Hoop and band iron	6 00
Sheet iron	5 00
Wrought drillings	6 50
Malleable iron	7 00

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

THE CADY MFG. CO.

283 W. River St., CLEVELAND, O.

AUTOMATIC MACHINERY.
Power Presses, Dies, Drop Hammers, Punches and Shears, Wire Straighteners and Cutters, Wire Forming Machines
SEND FOR CATALOGUE.

PERFORATED METALS
OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,
PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON. PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

Splice Bar Punch. (1)

—THE—
Long & Allstatter Co.
HAMILTON, O., U. S. A.
Manufacturers of Belt, Steam and Electrically driven
POWER PUNCHES and SHEARS,
for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc. Send for Catalogue.

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WESTMORELAND FIRE BRICK CO.
MANUFACTURERS OF HIGH GRADE **FIRE BRICKS**
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.

PL DIXON'S PERFECT LUBRICATING GRAPHITE.
The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease
NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.
An Interesting and Instructive Pamphlet will be sent Free of Charge.
JOS. DIXON CRUCIBLE CO. Jersey City, N. J.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.
CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.25c@1.35c
Angles	1.20c@1.25c
Tees	1.35c@1.45c
Universal Plates	1.20c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 30
4½ to 6 by ⅜ to 1 inch	1 35
1¾ to 6 by 1¼ to 2 inch	1 50
1¼ & 1¾ by ⅜ to ¾ inch	1 35
1 & 1¼ by ⅜ to ¾ inch	1 40
⅝, ⅜, ⅞, by ⅜ to ⅜ inch	1 50

Round and Square.

1 to 1⅞ inch	1 30
2 to 2¾ inch	1 40
2¾ to 3½ inch	1 55
3½ to 4 inch	1 80
4¼ to 4½ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅜ to 1¼ inch	1 50
⅝ to ¾ inch	1 50
½	1 70
¾	1 90

Half Oval and Half Round.

1¼ to 3 inch	1 85
⅜ to 1¼ inch	1 65
⅝ to ¾ inch	1 90
¼	2 05
⅜	3 15

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 40
1 to 1¾ by ¼ and 5-16 inch	1 45
¾ to ⅞ by ¼ and 5-16 inch	1 55
½ to ⅝ by ¼ and 5-16 inch	1 80

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1½ to 1⅜, No. 13, 14 and 15	1 90
1½ to 1⅜, No. 16, 17 and 18	1 95
1½ to 1⅜, No 19 and 20	2 00
1½ to 1⅜, No. 21	2 10
1½ to 1⅜, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16, 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16, No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
11-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅝, No. 13, 14 and 15	2 60
⅝, No. 16, 17 and 18	2 70
⅝, No. 19 and 20	2 80
⅝, No. 21	2 90
⅝, No. 22	3 00
⅝, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16, No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
⅜, No. 13, 14 and 15	3 50
⅜, No. 16, 17 and 18	3 60
⅜, No. 19 and 20	3 70
⅜, No. 21	4 00
⅜, No. 22	4 10
⅜, No. 23	4 25

Light Band.

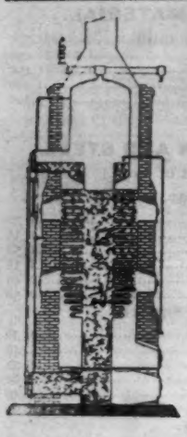
1½ to 6 by ¼ to 3-16 inch	1 60
1½ to 6 by Nos. 11 and 12	1 65
1 to 1¾ by ¼ to 3-16 inch	1 65
1 to 1¾ by Nos. 11 and 12	1 70
⅞ and 13-16 by ¼ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ¼ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ¼ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅜ to 3-16 inch	2 20
¼ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95



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WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below.

The Falcon Tin Plate & Sheet Co., }
Niles, O., Aug. 18, 1893. }

Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

The Falcon Tin Plate & Sheet Co.,
By Warner Arms, Pres't.

C. P. ADAMS,
807 The Cuyahoga, - CLEVELAND. O.

C. W. HUNT COMPANY,
45 Broadway, New York,
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Engineers' and Contractors' MACHINERY
For Hoisting and Conveying Purposes.

SECTIONAL TRACK, INDUSTRIAL AND CABLE RAILWAYS.
BARROWS, COAL BUCKETS, WIRE ROPE, TIP CARS, ETC.

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DEALERS IN A FULL LINE OF
MACHINISTS' SUPPLIES.
No. 17 South Canal Street, Chicago.
Morse Twist Drills, Kearney & Foot's Files. Wiley & Russell's Lightning Screw Plates, etc , Billings & Spencer's Wrenches, etc.

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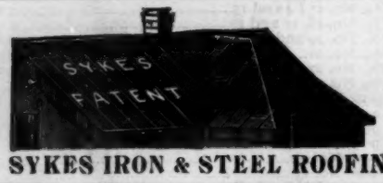
CLEVELAND, - OHIO,
—MANUFACTURERS OF—
BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs, Steel Rails, Steel Beams, Channels and Angles. Steel Forgings, Bar Spring, and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire, Iron and Steel Plates, Galvanized and Black Sheet Iron and Steel Corrugated Iron Roofing.



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SYKES IRON & STEEL ROOFING CO., - Chicago and Niles, O.

Moffet Portable Drill
UNSURPASSED AS A REAMER.
Weighs 48 pounds and drills from ⅜ to 2 inches diameter.

Runs with Steam or Compressed air.
Will Work in Any Position.
An Economical Substitute for Rachet Drilling.
Send for Circular.

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J. G. TIMOLAT
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Subscribe for The Iron Trade Review, $3 per year.

No. 15-17	2 05
No. 18	2 20
No. 20	2 30
No. 22-24	2 40
No. 25.26	2 50
No. 27	2 60

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 60
Shell	1 85
Flange	2 10
Marine Flange	2 35
Fire Box	3 35

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. ℔. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½
7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in	09½
⅜ to 11-16 and 4⅛	10
⅛ to 6 in	10½
¼ to 9-32 and 6¼ to 7 in	11
3-16 in	13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price, 1 80
Tire	" 1 85
Spring	" 2 20
Sleigh Shoe	" 2 20
Toe Calk	" 2 05
Cutter Shoes, tapered and bent	" 2 45

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 40

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ lb 3

Drill and Drill Sockets.

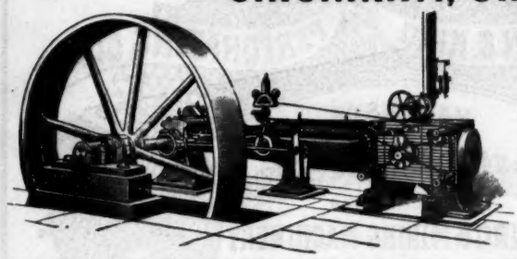
Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1¼"	dis 50&10
Morse Taper and Straight Shank Larger than 1¼"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 to Flour, C. F 46 gr.	150 gr.	F. FF.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c

THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



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Shafting, Hangers, Pulleys.

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Sportsmen,
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Athletes,
Busy-men,
Women, and all young-hearted folks delight in . . .

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IN the hammock . . . . . during long summer days and about the family hearth when the north . . . . wind blows, it is a favorite ever with young and old. **Outing preaches** the gospel of fresh air. **It is the stout apostle** of pure minds, pure hearts, pure lives. **It fosters every pastime** and healthful exercise. **It is a wonderful agent** for recalling time-sweetened memories. **Its pages** mirror the sports of every land. **It teaches** that a strong mind in a strong body bring success.

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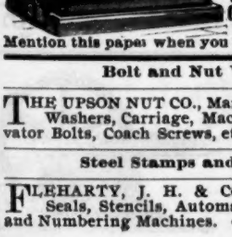
Stationary & Portable



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Dwarfs in size and Giants in Strength.

Costs only 10 cents a Day per H. P. to run them, & scarcely any attention.

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CINCINNATI, O.

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Visit picturesque Mackinac Island. It will only cost you about $12.50 from Detroit; $15 from Toledo; $18 from Cleveland, for the round trip, including meals and berths. Avoid the heat and dust by traveling on the D. & C. floating palaces. The attractions of a trip to the Mackinac region are unsurpassed. The island itself is a grand romantic spot, its climate most invigorating. Two new steel passenger steamers have just been built for the upper lake route, costing $300,000 each. They are equipped with every modern convenience, annunciators, bath-rooms, etc., illuminated throughout by electricity, and are guaranteed to be the grandest, largest and safest steamers on fresh water. These steamers favorably compare with the great ocean liners in construction and speed. Four trips per week between Toledo, Detroit, Alpena, Mackinac, St. Ignace, Petoskey, Chicago, "Soo," Marquette and Duluth. Daily between Cleveland and Detroit. Daily between Cleveland and Put-in-Bay. The cabins, parlors and staterooms of these steamers are designed for the complete entertainment of humanity under home conditions; the palatial equipment, the luxury of the appointments, makes traveling on these steamers thoroughly enjoyable. Send for illustrated descriptive pamphlet. Address A. A. SCHANTZ, G. P. & T. A., D. & C. Detroit, Mich.

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Norton's.....dis 60@70
Grant.....dis 60@70
Sterling.....dis 60@70
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60@70
Vulcanite.....dis 60&10
Hamden.....dis 60&10@70
Cyclone.....dis 60@60&10

Files.

Arcade.....dis 60&10@60&10&10
Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....12c
" " " " over 5 lbs.....10c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15½	11½	8½	6	5¾	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887.....dis 85
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$1.10
{ Less than car lots...$1.25

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 9@10
Russia " " .....₩ lb 14
Italian " " .....₩ lb 13@19
Plumbago Piston.....₩ lb 40
Peerless.....₩ lb 60
Morrison's " .....₩ lb 45
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48
Rainbow.....{ Full Rolls.....45c ₩ lb
{ Less than Full Rolls. 50c ₩ lb
Eclipse Gasket.....₩ lb 75

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 50
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 55@60

Rivets.

Iron, Thousand, list November 17, 1887 dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17, 1887.....dis 50&10@60
Copper.....dis 50@50&10

Saws.

Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....70c per ft
" Dexter Cross-cuts.....50c "
" Diamond " .....30c "
" Tuttle Tooth Cross-cuts.....25c "
" One-man Cross-cuts.....32c "
No. 1 Handles.....23c per pair
No. 6 " .....16c "
Excelsior Saw Tools.....$6 per doz
Derfection " .....$15 "
Petroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
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Philadelphia and New York	* 1.40 pm	*11.15 am
Baltimore and Washington	* 1.40 pm	*11.15 am
Alliance and Pittsburgh	* 1.40 pm	*11.15 am
Ravenna and Alliance	† 3.25 pm	† 9.50 am
Hudson and Ravenna	* 5.10 pm	* 8.15 am
Philadelphia and New York	*11.10 pm	* 5.25 am
Baltimore and Washington	*11.10 pm	* 5.25 am
Alliance and Pittsburgh	*11.10 pm	* 5.25 am

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FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8.40 am	* 5.15 pm
Akron, Columbus & Zanesville	†12.45 am	*11.55 pm
Akron and Columbus	* 8.40 pm	*5.15 pm
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Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:35 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Garrett	†3:00 P M	†11:00 A M
Wooster		*6:30 P M
Akron, Canton & Marietta	†3:00 P M	†11:00 A M
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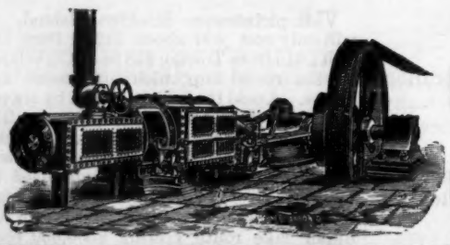

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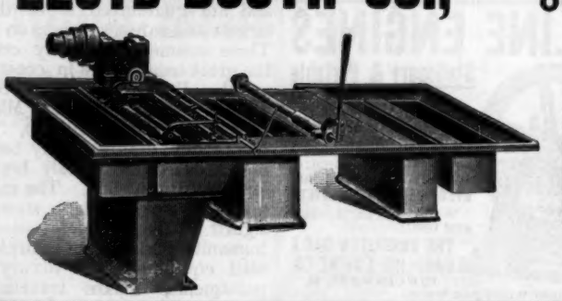

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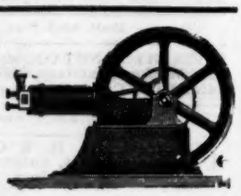

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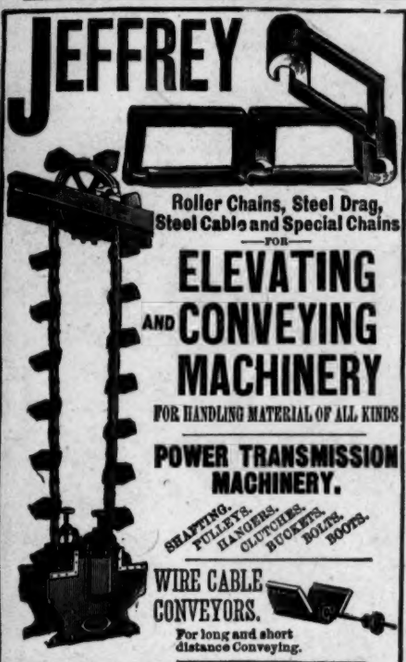

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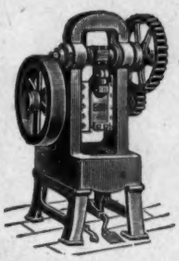

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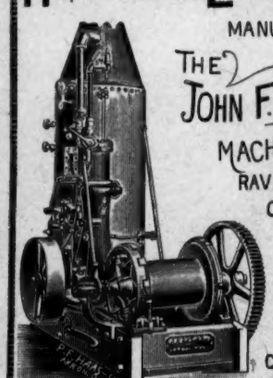

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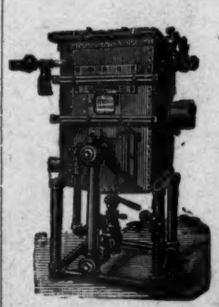

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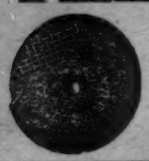

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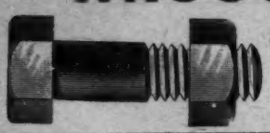

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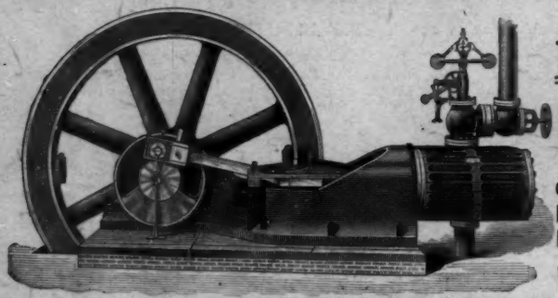

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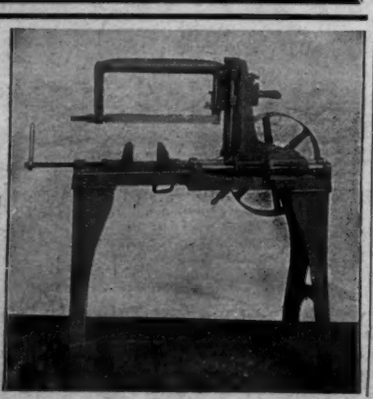

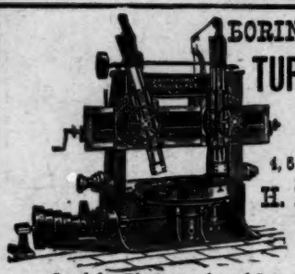

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